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ABSTRACT

Experiments in language teaching have indicated that, especially in the case of teaching English as a foreign language, no pronunciation of English sounds natural unless the intonation (prosodic features) is fairly acceptable. Even with satisfactory consonants and vowels, a phrase with incorrect melody still sounds foreign. On the other hand, when brief phrases are given proper pitch pattern, large errors in consonants and vowels seem much less important. English is spoken with a stress-time rhythm; the everyday speech of Chinese tends to be a polysyllabic language which often combines two or more syllables. The rate of utterance of a succession of syllables, unlike that of English is syllable-timed, the length of each syllable remaining approximately the same. Therefore, in teaching Chinese speakers to learn English, the shift from their tendency toward a syllable-timing rhythm to a stress-timing rhythm is very necessary. Consquently, syllable analysis in both languages must become a basic step in the learning process. This contrastive study of American English and Mandarin Chinese examines the syllable structure and prosodic features of both languages and relates this analysis to language teaching. (AMM)

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AN APPROACH FOR TEACHING AMERICAN ENGLISH TO CHINESE SPEAKERS BASED ON A CONTRASTIVE SYLLABIC AND PROSODIC ANALYSIS

by

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The University of Texas
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CHAPTER I

INTRODUCTION

1.1 Justification of this Study

For a rather long time, linguistic study has shown that language is most completely expressed in speech. Language learning from the very beginning of human life up to maturity, most linguists and language teachers would agree, is a process of the development of all the human language mechanisms in the individual. From an acoustic and articulatory point of view, human language activity is accessible principally in a series of sounds that in a physical sense are somewhat like the sounds that animals, birds, and other nonhuman beings usually utter. However, the human speech sounds, as the linguistic analysts indicate, are arbitrarily arranged in certain definite structures, and formed into a system so that they can generate an infinite variety of meanings with which mankind can communicate. One of the most important of such structures is the syllable,[1] or a sequence of syllables as well as the prosodic features of the syllables.

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[1] R. H. Stetson indicated that F. de Saussure taught that the syllable is a basic unit in which the phoneme has a function, Bases of Phonology (Oberlin, Ohio, 1945), p. 17. Roman Jakobson and Morris Halle also indicated that the elementary pattern underlying any grouping of phonemes is

No doubt, it is obviously true that, from about 1920 on, chiefly through the efforts of such linguists as Edward Sapir, Leonard Bloomfield, and Prince Nicholas Trubetzkoy, linguistic analysis began to show that there is a set of smallest distinguishable speech sounds constituting the syllable. These sounds perform a specific function in speech: they differentiate one syllable from another. For such significant functional units of sounds, the term "phoneme" has been widely adopted. This stage of analysis, which builds on phonetics and is known as "phonemics," has by now been accepted by most scholars as an essential part of linguistic analysis. These units of speech sounds, called phonemes, in general, have no meaning value at all by themselves, however.[2] It is

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the syllable in Fundamentals of Language (The Hague, 1956), p. 20. They pointed out that E. Polivanov was the first to draw attention to the "phonemic syllable," labelled "syllabeme," and regarded as the basic constructive cell in the speech sequence (cf. his Syllabeme and A. Ivanov's Grammatika Sovremennogo Kitaiskogo Jazyka [Moscow, 1930]).

[2] Cf. R. H. Stetson: "It is apparent that the phonemic system cannot be constituted without reference to the syllable and its factors, and to the train of syllables which furnish a varying context for the syllables with their factors" (p. 25). And Roman Jakobson, C. Gunnar M. Fant, and Morris Halle: "The distinctive features and phonemes possess no meaning of their own," Preliminaries of Speech Analysis (Cambridge, Mass., 1965), p. 14. Also cf. Robert A. Hall, Jr., Introductory Linguistics (New York, 1964), p. 31.

not until they are combined into certain definite structures, that is, fall into a syllable or a sequence of syllables, that they are directly associated with any meaning values.

Experiments in language teaching have indicated that, especially in the case of teaching English as a foreign language, no pronunciation of English sounds natural unless the intonation (prosodic features) is fairly acceptable. Even with satisfactory consonants and vowels (phonemes), a phrase with incorrect melody still sounds foreign. On the other hand, when brief phrases are given the proper pitch pattern (prosodic features), large errors in consonants and vowels seem much less important.[3]

It has long been known that English is a stress language; that is, it is spoken with a stress-timed rhythm.[4] Such a stress is intimately bound up with the syllable. English has a great number of polysyllabic words which have an inherent stress pattern in that one and the same syllable always has stronger stress than any other. In an utterance in English the stressed syllables come at evenly spaced intervals, and any unstressed syllables falling in between the stressed ones are simply fitted in with greater or lesser stress as may be necessary for the rhythm. In this type of rhythm, two stressed syllables will take up approximately the same amount of time no matter whether there are none, two, or five unstressed syllables in between. Therefore, the syllables in either words or phrases or sentences are of uneven length. In this respect, Chinese, however, is not the same as English. Of course, the Chinese character represents a monosyllable and has for a century attracted the attention and interest of general linguists, encouraging them to consider Chinese the most typical example of a monosyllabic and isolating tongue. But the everyday speech of Chinese is not always monosyllabic; it tends to be a polysyllabic language which often combines two or more syllables for expression of a great many ideas in daily living. Such compound structures are more like the words in English. However, in the normal speech of Chinese, the rate of utterance of a succession of syllables, unlike that of English, is syllable-timed, with the length of each syllable, remaining approximately the same. Since words of one syllable in general have no stress pattern, each syllable receives a slight even degree of stress. That is, Chinese speakers tend to utter an even succession of syllables with approximately the same amount of time allotted to each in speech at a normal speed. Such rhythm is known as syllable-timed because the timing is determined by the number of syllables. This term is widely used in describing a number of languages such as French, Spanish, and Italian.[5] Therefore, in teaching Chinese speakers to learn English, the shift from their tendency toward a syllable-timing rhythm to a stress-timing rhythm is very necessary. Consequently, the syllable analysis in both languages must become a basic step in the learning process.

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[3] K. L. Pike, The Intonation of American English (Ann Arbor, 1945), p. 107.

[4] The first scholar who drew attention to this fact is Joshua Steele in An Essay towards Establishing the Melody and Measure of Speech (London, 1775). Later Coventry Patmore indicated: "A simple series of isochronous intervals, marked by accents, is as natural to spoken language as an even pace is to walking," "English Metrical Critics," The North British Review, XXVII (1857), 127. Lloyd James had more discussion of this fact and spoke of two types of such rhythm, labeled "machine-gun rhythm" and "Morse-code rhythm," Speech Signals in Telephony (London, 1940), p. 25. For these terms, K. L. Pike gave two convenient terms instead: "syllable-timed rhythm" and "stress-timed rhythm," Intonation, p. 35.

In addition to stress, other prosodic features are relevant to the syllable. As Stetson has indicated: "'Juncture' and the related 'pauses', frontier markers, must get their meaning in the train of syllables. And the fundamental classification of the 'syllabic' and the 'non-syllabic' has no meaning except as an explicit reference to the unit of the syllable and its factors."[6] Einar Haugen also said: "Stress, pitch, duration, and juncture--all of them are somehow related to the syllable. [Their] effects are visible whether we can see or not."[7] Therefore, a valid analysis of prosodic phenomena depends on the understanding of the nature of the syllable. Without reference to the syllable, the factors of timing are meaningless.

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[5] Yuen Ren Chao pointed out: "Most Chinese dialects have a rhythm similar to that of French, in which syllables succeed one another in a flat-footed fashion. . . . Mandarin is one of the few Chinese dialects which is a mixture of French rhythm and English rhythm. The majority of syntactic words have the French rhythm; that is, each syllable of a word is moderately stressed, with the last syllable slightly more stressed than the rest," Mandarin Primer (Cambridge, 1948), p. 26. For the author's purposes any change in rhythm caused by this latter stress would not be sufficient to affect the distinction made between syllable-timed and stress-timed languages. In addition, "English also has a rhythmic type which depends to a considerable extent upon the number of its syllables, rather than the presence of a strong stress, for some of its characteristics of timing; in English, however, the type is used only rarely" (cf. Pike, Intonation, p. 35).

Based on the assumptions discussed above, the author firmly believes that a contrastive analysis that is based on an investigation of the structure of syllables and their prosodic features in both English and Chinese would be most beneficial. From such a study it should be possible to generalize some rules which can be applied to the teaching of either language. Moreover, as the author, keeping such a hypothesis in his mind, carefully reviewed the literature which related to such a study, he quickly found that so far little has been done on the syllable either in English or in Chinese. Under these circumstances, such a contrastive analysis seems worthwhile to undertake, since it may be a valuable contribution to language teaching. This seems particularly true since the usual introduction to language study in Chinese is necessarily syllabic, because of the monosyllabic nature of Chinese. Consequently, a useful bridge between the two languages--as far as language learning and teaching is concerned--would seem to be the syllable.

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[6] Stetson, p. 25.

[7] Cf. Einar Haugen, "Phoneme or Prosodeme?" Language, XXV (1949), 280-281.

1.2 Scope and Definition

Following the adoption of the "phoneme" as an essential part of linguistic analysis, the identification and specification of the phonemes of speech sounds shortly came to be the focal point in discussions among linguists. Bloomfield first discussed it in his Language, as follows:

> Among the gross acoustic features of any utterance, then, certain ones are distinctive, recurring in recognizable and relatively constant shape in successive utterances. These distinctive features occur in lumps or bundles, each one of which we call a phoneme. The speaker has been trained to make sound-producing movements in such a way that the phoneme-features will be present in the sound-waves, and he has been trained to respond only to these features and to ignore the rest of the gross acoustic mass that reaches his ears.[8]

Again he wrote:

> The importance of a phoneme, then, lies not in the actual configuration of its sound-waves, but merely in the difference between this configuration and the configurations of all the other phonemes of the same language. For this reason even a perfected knowledge

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[8] Bloomfield, p. 79.

> of acoustics will not, by itself, give us the phonetic structure of a language.[9]

It seems, then, that he was in agreement with Sapir's point that phonemes should be classified into categories in terms of their possibilities of combination with other phonemes in the speech chain, and that, using the phonetic criteria in prelinguistic analysis, phonemic analysis must be based primarily on distributional patterns in order to have relevance in structural linguistics.[10] Along this line, in his article "On Defining the Phoneme,"[11] W. Freeman Twaddell proposed articulatory rather than acoustic characterization of phonemes. Louis Hjelmslev also pointed out: "As phonemes are linguistic elements, it follows that no phoneme can be correctly defined except by linguistic criteria, i.e., by means of its function in the language."[12] Such an approach classifying the phoneme "primarily in terms of its distribution"[13] and employing phonetic criteria as a base was soon accepted by most linguists.

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[9] Bloomfield, p. 128.

[10] Bloomfield, pp. 129-130.

[11] W. F. Twaddell, "On Defining the Phoneme," Language Monograph, XVI (1935).

[12] Louis Hjelmslev, "On the Principles of Phonematics," Proceeding of 2nd International Congress of Phonetic Sciences (Cambridge, Mass., 1936), 49-54. Cf. J. R. Firth, "Structural Linguistics," Transaction of the Philological Society (1955), 83-103.

[13] Archibald A. Hill, Introduction to Linguistic Structures, From Sound to Sentence in English (New York, 1958), p. 47.

The well established linguistic method of identifying the phoneme by minimal pairs (the method of testing for sameness or difference by commutation in identical phonetic context) has been widely used.

However, sometime after the distributional classification had been strongly established and was being used by most linguists, an approach based on acoustical properties of speech sounds has been proposed. With the help of the sound spectrograph and other modern acoustic instrumentation, several coordinated research projects by linguists and other experts have made very significant analyses of various features of the sounds of human speech. The publication of Preliminaries to Speech Analysis by Jakobson, Fant and Halle in 1952 presented one of the most interesting and significant constructs that could be used in the specification of speech sounds in terms of their inherent physical parameters: frequency, intensity, and wave composition. The latter group has conclusively shown that there are two classes of distinguishing characteristics--inherent and prosodic--which can be described in terms of twelve binary features that can be used to specify each phoneme in a language.[14] These twelve features with their binary oppositions are said to be universal and common to all language and presumed to be independent of one another. Criticism of these so-called "distinctive features" has been heavy. A comment, by K. N. Stevens, seems to be fairly representative:

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[14] Roman Jakobson, C. Gunnar M Fant and Morris Halle, Preliminaries to Speech Analysis (Cambridge, Mass., 1965), pp. 8-40.

> Many of the features are at present defined in the acoustic domain in rather general terms, and statistical data for a group of speakers is not available. Further detailed experimental analysis is required to obtain a more precise definition of those features. For example, the acoustic properties of turbulent and transient excitation associated with the fricative and stop consonants are not thoroughly understood at present.[15]

Following this comment, recently, an investigation undertaken by Clara M. Bush shows that the acoustic specification for two distinctive feature oppositions (tense versus lax and grave versus acute) fail to apply to the four English fricatives /f/, /v/, /θ/ and /ð/. The variations among allophones in specified acoustic measures are sufficient to necessitate the redefining of the Tense/Lax and the Grave/Acute distinctive features to render them appropriate to these four fricatives. Similarly, it is important to learn if the variables which affect these four fricatives also influence other phonemes sufficiently to affect their distinctive feature specifications.[16] So far, however, there is no clear reason to reject all or part of the distinctive feature theory itself on the basis of Bush's finding. As the authors of the distinctive feature theory themselves have indicated, only the information provided by additional research can make possible the appropriate modifications and refinements in the theory's application;[17] and certain concepts may have to be redefined in a manner differing somewhat from the original theory.[18] Since further research into the acoustic character of these four fricatives of English is needed to provide a basis for statements about the distinctive feature essential to their recognition and to specify the acoustic parameters on which relevant dichotomies may be tested for each cognate pair, the author, for such a practical purpose as teaching English as a foreign language to Chinese speakers in terms of the structure of the syllable of both languages, would like to accept the former approach for specification of speech sounds rather than a less complete scheme using distinctive features. For this reason, a phonemic analysis based on both distributional and phonetic criteria of differentiation is used; the particulars of the system to be used will be presented in the next chapter.

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[15] K. N. Stevens, "Review of Preliminaries to Speech Analysis, by Jakobson, Fant and Halle," Journal of the Acoustic Society of America, XXV (1953), 163.

[16] Clara N. Bush, Phonetic Variation and Acoustic Distinctive Features, A Study of Four General American Fricatives (The Hague, 1964), pp. 137-143.

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[17] C. G. M. Fant, "On the Predictability of Formant Levels and Spectrum Envelope from Formant Frequencies," in For Roman Jakobson, ed. M. Halle *et al*. (The Hague, 1956), 109-119.

[18] Morris Halle, The Sound Patterns of Russian (The Hague, 1959), p. 52.

The syllable is, perhaps, the most extensively discussed of all phonetic phenomena. Since there is least agreement on the nature of the syllable among phoneticians, it seems that modern linguistic studies are inclined to regard the syllable as an elusive unit; more minutely measurable units of speech sound--phonemes--are preferred. However, all linguists are agreed that such a thing as the syllable exists in speech as well as writing; and all, from the earliest times, utilize the concept of the syllable (sometimes adopting different terms instead) in analyzing the structure of speech sounds. In particular, the syllable has been used as the basic unit in the description of the prosodic system of language and in describing verse forms that are based on prosodic patterns. The author, in this study, simply attempts to synthesize what is definitely known concerning the syllable, using distributional and phonetic criteria as the basis, and one definition of the syllable which will be reasonably satisfactory for the structure of both English and Chinese.

Among many definitions of the syllable,[19] a working definition of the syllable for this study which has been found most useful is as follows: The syllable is a minimal structure of phonemic construction using a vowel unit as its nucleus; it is often accompanied by other characteristics

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[19] Generally speaking, the attempts to define the term syllable fall into two main categories: those which seek a universal definition in phonetic terms such as "the prominence (sonority) theory" and "the pulse theory"; and those which

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look for a specific functional definition in terms of the linguistic structure. The following definitions of the syllable are examples of these categories, roughly in chronological order:

Daniel Jones indicates that "a syllable consists of a sequence of sounds containing one peak of prominence" (Outline of English Phonetics [London, 1932], p. 54). Louis Hjelmslev defines a syllable as "a chain of expression including one and only one accent" ("The Syllable as a Structural Unit," Proceedings of the International Congress of Phonetic Sciences [Ghent, 1938], p. 226). Benjamin Lee Whorf regards the syllable in phonology as a structural unit most economically expressing the combinatory latitudes of vowels and consinants within a given language ("Linguistics as an Exact Science," The Technology Review, XLIII, 61-3, 80-3). R. H. Stetson devoted a great part of his professional life to defining the syllable physiologically, and indicated: "the syllable is one in the sense that it consists essentially of a single chest pulse, usually made audible by the vocal folds, which may be started or stopped by a chest movement or by a consonant movement" (Motor Phonetics, 2nd ed. [Amsterdam, 1951], p. 171). K. L. Pike defines the syllable in two different ways. He accepts Stetson's idea as a definition of phonetic syllable and indicates: "A syllable is a simple unit of movement of lung initiator . . . which includes but one crest of speed. . . . Physiologically, syllables may also be called chest pulses." However, he concludes that the phonetic syllable is different from the phonemic syllable. The latter is "a unit of sound for a particular language such that one syllable represents a single unit of stress placement, or of tone placement, or of timing, or of vowel length, or of morpheme structure (in general, a phonemic syllable will be constituted of a single phonetic syllable with some rearrangement of the grouping in accordance with structural pressures)" (cf. Phonetics [Ann Arbor, 1943], p. 116 and Phonemics [Ann Arbor, 1947], p. 60, p. 65, and p. 246. B. Bloch and G. L. Trager pointed out that the syllable is defined in terms of "syllabic," and "syllabics" are defined as "sounds which constitute the peaks of sonority" (Outline of Linguistic Analysis [Baltimore, 1942], p. 22.) Kemp Malone indicates that a syllable "is made up of one or more phonemes. The main phoneme of a syllable is called a sonant; the such as stress, tone, or length. The vowel is usually preceded or followed by a consonant unit or a permissible consonant combination. The nature of the syllable involves a dynamic process of "onset" (the beginning of the articulation of the syllable), a "peak" (the center), and a "coda" (what comes after the peak and before the onset of the next syllable). All the larger sequences, usually called polysyllables, are to be analyzed as succession of syllables.

The term "prosodic features" in this study refers to so-called "non-linear" phonemic structure and is generally synonymous with suprasegmentals, which usually refer to the three phonemically significant phenomena of sounds: stress,[20] that is, the degree of loudness or intensity with which a

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subordinate phonemes are known as consonants. A syllable has one and only one sonant; it may (but need not) have one or more consonants as well. The sonant of a syllable dominates its syllable by virtue of its relatively great sonority; the consonants of a syllable are subordinated to their sonant by virtue of their relatively slight sonority" ("Syllabication," College English, XVIII [Jan., 1957], p. 202). The author's definition of the syllable is based on the studies of O'Connor and Trim, and Hockett: J. D. O'Connor and J. L. M. Trim, "Vowel, Consonant, and Syllable--A Phonological Definition," Word, IX (1953), 122; and Charles F. Hockett, A Manual of Phonology (Baltimore, 1955), p. 52 and p. 150.

[20] Other terms, such as accent and emphasis, are sometimes used, but are unsatisfactory. Accent is ambiguous, since it may refer to accent marks on paper, or to regional or foreign dialects. Emphasis properly relates to the art of speech.

syllable is uttered;[21] pitch, the frequency of vibration in the musical tone simultaneously occurring with the syllables;[22] and juncture, a syllabic separator or terminal.[23]

The syllable has existed ever since human speech first developed. No doubt, along with human speech, there also have always been prosodic features simultaneously existing together with syllables. Therefore, both syllable and prosodic features of human language have a rather long history. But in this study the author has made no attempt to deal with the historical development of these phenomena of human speech in either language. In addition, as mentioned previously, so far there is no agreement regarding the definition of syllable among the linguists. The problem of what is the genuine nature of syllable has baffled the best linguistic minds of the world for many generations. The author is not in this study prepared to solve this puzzling problem, but instead, presents simply a synthesis of it in terms of distributional and phonetic criteria. A hypothesis to be tested is that a thorough contrastive analysis in terms of an investigation of the structure of syllables with their prosodic features can render contributions to the improvement of language teaching. To test this hypothesis, the present study is designed.

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[21] Cf. Jones, p. 245; Bloomfield, p. 110; and Hill, p. 14.

[22] Cf. Bloomfield, p. 114.

[23] Archibald A. Hill, "Non-Grammatical Prerequisites," Foundations of Language, II (1966), 319-337.

1.3 Choice of Dialects

American English has developed several dialects. Each has its own characteristics and can be differentiated by pronunciation, vocabulary, and syntax. However, the number of major dialect areas in the United States is still a matter of dispute. After the publication of Hans Kurath's Word Geography of the Eastern United States,[24] a division of three major belts of dialects: Northern, Southern, Midland, the latter being in turn divided into North Midland and South Midland, has been proposed by Raven I. McDavid[25] and has been generally accepted by most dialectologists. This study will use the Midland dialect, which has also been called "General American." The reason for this choice is not only that it is the most common,[26] but also that its pronunciation is used in John S. Kenyon and Thomas A. Knott's Pronouncing Dictionary of American English,[27] which is now widely used in the Republic of China. In addition to this choice of a regional dialect, the author is also restricting himself to social dialects on these four levels: mature, casual, standard, and good, using Joos's criteria.[28]

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[24] Hans Kurath, A Word Geography of the Eastern United States (Ann Arbor, 1949).

[25] Raven I. McDavid, "The Dialects of American English," in W. Nelson Francis, The Structure of American English (New York, 1958), Chapter 9.

[26] H. L. Mencken indicates: ". . . it was customary to state that there were three of [major dialects]: New England, Southern and so-called General American or Western. The most important was that which Kurath had earlier called Western American, considered as the tongue which the overwhelming majority of Americans speak and the one that Englishmen always have in mind when they discuss American English. Its territory

Chinese also has several dialects, some of which can be considered separate languages as far as speech is concerned. For this study the Mandarin dialect has been chosen for two rather important reasons: first, it is spoken by

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was defined to include all of New England west of the Connecticut River, the whole of the Middle Atlantic area save the lower Eastern Shore of Maryland and lower Delaware, and all the region west of the Cotton Belts of Texas and Arkansas and north of central Missouri and the Ohio River, with the mountain country of the South as an exclave. No other group of American dialects is so widespread, and none other is still spreading. Because of its spread it was usually called General American" (The American Language [New York, 1963], pp. 454-455). Again, he indicates: "There remains the speech of the overwhelming majority of Americans--according to some authorities, at least 120,000,000 of the 180,000,000 inhabitants of the continental United States" (Mencken, p. 405).

[27] John S. Kenyon and Thomas A. Knott, A Pronouncing Dictionary of American English (Springfield, Mass, 1953).

[28] Cf. Martin Joos, The Five Clocks (Bloomington, 1962).

roughly two-thirds of the population and three-fourths of the area of China proper;[29] second, the Chinese are also taking measures to encourage speakers to use Mandarin speech sounds as the standard so as to unify gradually the various dialects and form a common national language; it is natural that Mandarin will be the one used in this comparison. Since the author is from Honan province, his idiolect is of that dialect of Mandarin. The four social dimensions used for English will also be used for Chinese.

1.4 Review of Literature

The earliest systematic analysis of work bearing on the structure of English syllables with their prosodic feature was done by Daniel Jones.[30] He defines the syllable as a sequence of speech sounds containing one peak of prominence. Further, a sound which constitutes a peak of prominence is said to be syllabic. The syllabic sound of a syllable is generally a vowel, but consonants may also be syllabic.[31]

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[29] Chao indicated that there are nine main groups of dialects, which fall into three major zones. The first zone is the southeastern coastal provinces; the second, the great Mandarin-speaking region; the third, the territories and the borderlands of the southwestern provinces and the province of Sinkiang. In any areas certain non-Chinese languages are used in addition to the local Mandarin sub-dialects (cf. Chao, p. 6).

[30] Daniel Jones, An Outline of English Phonetics (London, 1932), p. 45.

[31] Jones, pp. 54-55.

In other words, the structure of a syllable must have a syllabic sound, which is generally a vowel, together with other sequences of sounds which are usually called consonants.

Jones has made a remarkable analysis of the prosodic features of English in terms of the structure of English syllables in his work. He discussed the nature of the prominence of the syllable and its relation to stress and intonation and pointed out that the prominence of the syllable may be modified by means of any one of three sound-attributes (length, stress, and intonation) or by combination of them. He made some rules and statements about stress (including word-stress and sentence-stress), rhythm, and intonation, all based on the structure of a sequence of syllables.

Following Jones's work on the syllable, a well known American scholar, Leonard Bloomfield, pointed out that the practical phonetic classification of speech sounds, even excluding non-distinctive features, is nevertheless irrelevant to the structure of the language, because they group the phonemes according to the linguist's notion of their physiologic character, and not according to the parts which the several phonemes play in the working of the language.[32] He gave such examples as the fact that "nasal" ([m] and [n]) sometimes serves as a syllabic in unstressed syllables, as in *bottom* ['batm̩], *button* ['botn̩], while the third one, [ŋ], does not. [l] serves as a syllabic in unstressed syllables only, as in *bottle* ['batl̩], while [r] may serve as a syllabic regardless of stress, as in *learner* ['lr̩nr̩]. To show these structural facts, he made a rather specific table in which he indicates there are two basic parts: namely, the non-syllabic part, which is always consonant sounds; and the syllabic, usually vowel sounds but sometimes consonants. Along with the two parts, called primary phonemes by Bloomfield, which form the syllable, there are also other characteristics called secondary phonemes by him, which refer to stress and juncture.[33]

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[32] Leonard Bloomfield, Language (New York, 1933), Chapter 8, "Phonetic Structure."

Since English is a polysyllabic language, Bloomfield's analysis of the structure of English syllables must reflect this fact: "Since every utterance contains, by definition, at least one syllabic phoneme, the simplest way to describe the phonetic structure of a language is to state which non-syllabic phonemes or groups of nonsyllabic phonemes (clusters) appear in the three possible positions: initial, before the first syllabic of an utterance; final, after the last syllabic of an utterance; and medial, between syllabics."[34] He carried out a survey of the position of non-syllabics based on this assumption and adopted the terms "main final," "pre-final," "second pre-final" and "post-final" in the analysis of final clusters in English syllables. He found that this classification sufficed to define every non-syllabic phoneme in the English language.[35] However, as to syllabics, he mentioned only a few of the pattern features.

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[33] Bloomfield called "pitch." He indicated that there are two kinds of pitch: medial and final, both related to the end of utterance (*ibid*., p. 130). He also has further discussion on both secondary phonemes in Chapter 7, "Modification," pp. 109-138.

The most thorough analysis of the syllabic sounds of English is a paper by George L. Trager and Bernard Bloch.[36] They pointed out that "in the structure of the syllable vowels are nuclear, consonants marginal"; both are sounds following one another in a sequence and are called segmental phonemes. In their analysis what Bloomfield called "secondary phonemes" are known as "juncture phonemes," which are defined by factors of rhythm, of the onset and contour of stress, and of the use of pre- and post-pausal allophones. Variations in loudness, tone, and quantity constitute the prosodic phonemes, which modify segmental sounds. These are called "suprasegmentals." In their study, Trager and Bloch begin with juncture phenomena, stress patterns and a summary of consonants, and then devote most of the article to the syllabic nuclei. Their conclusion concerning the pattern of English syllabic phonemes is that there are only six simple vowels (i, e, a, u, ə, o); with weak stress they occur in any kind of syllable, but with strong stress (loud, reduced loud, or medial) only in checked syllables. According to their analysis, every syllable containing a strongly stressed syllabic must end with a consonant phoneme. In order to account for what had previously been called "long vowels," they include in their analysis three (in some dialects four) consonants forming a special group called "semivowels" (w, j, h, r). Vowel nuclei containing semivowels could be considered either special allophones of vowels or phonetically long vowels realized as diphthongs. At any rate, these compound syllabics, structurally, are a combination of a vowel plus a consonant (/VC/). These nuclei have a much wider distribution than the simple vowels, but some of them occur only rarely under weak stress.

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[34] Bloomfield, p. 131.

[35] Bloomfield, pp. 131-138.

[36] George L. Trager and Bernard Bloch, "The Syllabic Phonemes of English," Language, XVII (1941), 223-246.

The first important attempt to give a comprehensive description of English within the framework of American descriptive linguistics was "An Outline of English Structure" written by G. L. Trager and H. L. Smith.[37] In the analysis of syllabic nuclei of English syllables, they established

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[37] George L. Trager and Henry L. Smith, An Outline of English Structure (Norman, Oklahoma, 1951).

the nine-vowel system: /i, e, æ, ɨ, ə, a, u, o, ɔ/ instead of the six-vowel system of Trager-Bloch. In addition to these simple vocalic nuclei, they also found that there are 27 complex nuclei. Each complex nucleus begins with one of the nine vowel qualities and ends with off-glides of three kinds: a glide to a higher and fronter position /y/; a glide to a higher, back, more rounded position /w/; and a glide to a more central unrounded position /h/. Thus there is a total of 36 syllabic nuclei which occur in English syllables. In dealing with the prosodic features they started from the basic analysis of English pitch made by Rulon S. Wells and extensively applied by K. L. Pike. They gave a very thorough treatment of the sound system, including the prosodic features. In particular, they called attention to the grammatical significance of stresses, pitches, and junctures (collectively called "suprasegmentals") and suggested that grammatical analysis could only be made by following the clues presented by these suprasegmental phonemes. Their analysis of four degrees of stress, four levels of pitch, and two kinds of juncture (one internal and three terminal) quickly came to be standard terminological categories among linguists in America.

In order to clarify the concepts of the syllable and the vowel versus consonant dichotomy, J. D. O'Connor and J. L. M. Trim undertook a systematic comparison of the distribution of all the phonemes and intended to show that a study of phoneme distribution is the proper theoretical basis for the establishment of vowel and consonant classes and that the syllable is best regarded as a structural unit most economically expressing the combinatory latitudes of vowels and consonants within a given language.[38] The method they used was to list all 34 phoneme combinations actually occurring, with no preconceptions as to vowel and consonant, syllabic and non-syllabic.[39] In their analysis they used the first two and the last two phonemes in monosyllabic and polysyllabic words, i.e., initial, post-initial, pre-final, and final positions. In each of the four positions considered, every phoneme was compared with every other phoneme with respect to the contexts they have in common. The conclusions to be drawn from their investigation are:

1. V has more claim to be considered as a central unit, and C is a marginal unit even from the sequential aspect.
2. The fact that V units stand side by side far less frequently than C units makes a statement of distribution in terms of discrete units with V as a central element and C as a marginal element more economical than one in which C was taken as central and V as marginal.[40]

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[38] J. D. O'Connor and J. M. Trim, 103-114.

[39] The 34 phonemes are: /p t k b d g c ǰ f θ s š h v ð z ž r l m n ŋ i I e æ a ɒ ɔ U u ʌ ɛ ə/. Note that /y/ and /w/ are not differentiated from /I/ and /U/. The total of possible combinations in both initial and final position, using the list of 34 phonemes, is 34x34=1156. Of these 424 were actually found as initial combinations, and 387 as final.

[40] O'Connor, p. 115.

In analyzing the structure of syllabics, they began with discrete units containing one vowel unit only, preceded and followed by a variety of consonant units. Then they tried to find out all the possibilities of combinations of 0 to 3 initial consonants (termed initial, normal-initial, and post-initial) and of 0 to 4 final consonants (termed pre-final, normal-final, post-final and 2nd post-final). Finally, through a careful examination of the various cases of these combinations, they concluded:

> The syllable may be defined as a minimal pattern of phoneme combinations with a vowel unit as nucleus, preceded and followed by a consonant unit or permitted consonant combination. All longer sequences are to be analyzed as a succession of syllables, the relative frequency of occurrence of various syllable-initial and syllable-final consonant combination furnishing a basis for determining the point of syllable division in cases where this is not immediately apparent from the analysis.[41]

The most distinguished study of syllable structure based on a very unusual point of view is the analysis by Charles F. Hockett in his A Manual of Phonology.[42] He points out that a syllable usually consists of three constituents: an "onset," a "peak," and a "code." The vowels occur only as syllable peaks. Syllables are defined by peaks and peaks by vowels. Every English syllable must contain a peak, either simple (one of a number of vowels) or complex (a vowel plus a semiconsonant /y w h/, perhaps in some cases /r/). A syllable may have a distinctive onset (man, snow, scrimp), or none (each, ouch, apple) at its initial position. Such onsets consist of from one to three consonants and semiconsonants; the clusters of two and three are relatively limited. Likewise, a syllable may have a distinctive coda (man, scrimp, glimpse, sixths) or none (day, idea). Such codas consist of from one to four consonants (not semiconsonants). One consonant which occurs as a coda /ŋ/ does not occur as or in any onset; another /ž/ is very rare as an onset. All the consonants which occur as onsets, however, occur also as codas. Based on the "onset-peak-coda" theory of syllable structure, he also indicates the prosodic features which the syllables carry, such as the junctures, "accentual system," vowel duration, and intonational system, all discussed thoroughly.

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[41] O'Connor, p. 122.

[42] Charles F. Hockett, A Manual of Phonology (Baltimore, 1955), p. 63.

One of the tersest and most thorough discussions which carries the technique of "phonologic syntax" far beyond what is done by Trager and Smith in their work is *Introduction to Linguistic Structures: from Sound to Sentence in English*, by A. A. Hill.[43] In Chapter 2, he deals with stress, juncture, and pitch. In Chapter 6, he makes a thorough analysis of the structural characteristics of sequences of phonemes. This analysis, called phonotactics, is directly related to the structure of English syllables. He starts his analysis with a typical minimal utterance, such as:

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[43] Hill, *Introduction* (New York, 1958).

$$\overset{31}{/\text{ow } \#/}\quad [\text{a syllable}].$$

He then points out that there are five classes of phonemes which can possibly occur in an utterance. The first three are pitch and stress, juncture, and vowel, which can be defined distributionally. The other two, consonants and three semivowels, are optional. Since vowels do not cluster, no two vowels can occur without an intervening semivowel, consonant or juncture. Therefore, the clustering habits of phonemes are almost altogether the clustering habits of consonants alone. Using permissibility of occurrence as the primary criterion, he divides these consonant clusters into three groups: namely, prevocalic consonant clusters, which are in initial position; prejunctural consonant clusters, in final position; and intervocalic consonant clusters, in medial position.[44]

Mandarin Chinese has a rather long history. It has its own phonetic system and written form. The transcription of Mandarin Chinese sounds into the Latin alphabet came relatively late. Although Matteo Ricci adopted the Latin alphabet as a system for transcribing Chinese sounds in the sixteenth century, the complete system of transcription known as the "Wade system" was not developed until the turn of the twentieth century. Later, "the Wade-Giles," "the Latinxua," "the Chinese National Romanization," "the Yale," and "the Pin Yin" appeared in rapid succession.[45] As a further development, some studies concerned with the syllable structure of Mandarin based on the theory of phonemes have been developed. The most valuable analyses are by Lawton M. Hartman III,[46] Charles F. Hockett,[47] Yuen Ren Chao,[48] and Akiyasu Todo.[49]

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[44] Hill, pp. 68-88.

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[45] The earliest discussion on the sounds of the Chinese language was done in *Sound and Symbol in Chinese* (London, 1923) by Bernhard Karlgren. However, it was general review of the language, with no details on the structure of syllable. Other previous analyses of Mandarin syllable structure from the phonological point of view are: Henri Frei, "Monosyllabisme et polysyllabisme dans les emprunts linguistique (avec un inventaire des phonèmes de Pekin et de Tokio)," Etudes de linguistique japonaise, *Bulletin de la Maison Franco-Japonaise*, VIII (1936), 123-134; Ting-ming Tchen, "Phonèmes de la langue Chinoise," *Bulletin de la Société de Linguistique de Paris*, XL (1937), 107-118; and M. Swadesh, "A Condensed Account of Mandarin Phonetic," *TCLP*, VIII (1939), 213-216. In 1953, Helen Wong published a paper, "Outline of the Mandarin Phonetic System," *Word*, IX (1953), 268-276; one year later, she published another paper, "Addenda et Corrigenda to 'Outline of the Mandarin Phonemic System,'" *Word*, X (1954), 71-72. In terms of the so-called "distinctive features," she pointed out that there are six vowels in Mandarin, namely /i ü ɨ u e a/. Probably the most important analysis of the Mandarin monosyllable that is based on the theory of the distinctive feature is a work by K. P Li, "Machine Recognition of Mandarin Monosyllable," *Project on Linguistic Analysis*, Report No. 9 (Columbus, Ohio, 1964), in which Li indicates that Mandarin Chinese has seven vowels: /i u a e y ɨ er/.

The syllable structure of Chinese is rather simple in comparison with the complexity of English. Each syllable is represented by a single character in the traditional writing system, and each has rather simple structure: it never has an initial consonant cluster and it must end with either a vowel, a vowel nucleus, or a vowel plus a nasal (/n/ or /ŋ/). Almost all earlier treatments of Chinese syllables have used the so-called "initial-final division," with much more attention being paid to the monosyllabic character of the language. In 1933 Bloomfield pointed out: "In Chinese we have the extreme of structural word-marking; each word consists of one syllable and of two or three primary phonemes: a non-syllabic simple or compound phoneme as initial, a syllabic simple or compound phoneme as final; and one of the pitch-schemes; the initial non-syllabic may be lacking; the language has no bound forms."[50] Hartman also interpreted the syllable structure of Chinese as having two parts: the initial and the final.[51] He defined the final as a part of the syllable which extends from the first semivowel preceding the syllabic nucleus (or from the syllabic nucleus itself if there is no preceding semivowel) to the end of the syllable; the initial is anything else that precedes the final. This includes those cases of zero initial where there is no initial consonant. Furthermore, he divided the finals into two subparts: those which end with an "r-like" sound and those which do not.[52] The latter, according to his analysis, may be grouped into three classes: those having predominantly low and mid vowels respectively and a residue having chiefly high vowels. Concerning the initial, he has done a thorough analysis of the so-called "palatal series" of initial consonants and approached the problem from a very different point of view. He also states tentatively that there exist two prosodic systems in Mandarin: namely, four prosodemes of tone and three prosodemes of stress.

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[46] L. M. Hartman III, "The Segmental Phonemes of the Peiping Dialect," Language, XX (1944), 28-42.

[47] Charles F. Hockett, "Peiping Phonology," JAOS, LXVII (1947), 253-67.

[48] Yuen Ren Chao, Mandarin Primer (Cambridge, 1948).

[49] Akiyasu Todo, "The Phonemes of the Peiping Dialect" (translated by William S-Y. Wang), Project on Linguistic Analysis, Report No. 4 (Columbus, Ohio, 1963).

Hockett, for convenience, also adopted the initial-final division in analyzing the monosyllabic structure of

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[50] Bloomfield, p. 182.

[51] Hartman, pp. 28-42.

[52] As will be shown in Chapter II, this "r-like" sound is better treated as a phonemic quality than as an allophonic variation.

Chinese (using instead the term "residual structure"). However, he did not treat Chinese as a purely monosyllabic language. Taking a different approach from Hartman's he began with a Chinese utterance and carried the analysis of prosodic features of Chinese much further than Hartman did. He points out that there is a biphoneme /iu/--the high-front round vowel--in addition to the three basic vowels /a e i/ and the retroflex semivowel /r/.[53]

Chao's analysis of the structure of the Chinese syllable was more practical than theoretical. He pointed out that a syllable of Chinese is made of three constituents: the initial, the final, and the tone. Following the Chinese National Romanization system, he described the articulatory features of all initials in his study, and listed all the finals of the syllables. In addition, he has done much work on Chinese tones with their sandhi variations and on a tonal spelling system.[54]

Tōdō defines the Chinese syllable as a group of phonemes forming one closure-opening sequence and having a vowel nucleus as its peak.[55] However, his treatment of the finals is different from the usual analysis; he divides them into three parts: medial (often semivowel), peak (vowel nucleus or main vowel), and syllable-final (vowel, semivowel, or nasal) He indicates that there are three vowels in Mandarin: namely, /a/ wide opening, /ə/ medium opening, and /i/ narrow opening; and also three semivowels /j, w, r/. Since Chinese syllables often end with a vowel, there must be three kinds of finals; he calls them "wide finals," "medium finals," and "narrow finals." There is no discussion of the prosodic features of the syllables in his study except for a brief description of the Mandarin tones.

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[53] Hockett, pp. 253-67.

[54] Chao, pp. 19-32.

[55] Tōdō, following a suggestion of de Saussure, classifies the Chinese sounds into seven grades, in terms of the degree of closure on the point of articulation, by the numbers of 0-7 (0 indicates a complete closure, 7 a wide opening). Therefore, every syllable is a combination of such grades, 0-7 (Tōdō, pp. 10-11).

On turning to the pedagogical side of such a study, strangely enough, one does not find much systematic discussion of language teaching based on the analysis of the syllable structures, although there always have been brief comments on the important function of the syllable in the structure of language. Probably the earliest scholar who paid much attention to the syllable in teaching was H. Marichelle, head of the school for the deaf in Paris. He appreciated the value of the syllable in teaching the deaf to speak, and published a remarkable experimental study of of the speech movements entitled La Parole.[57] It used

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[56] Tōdō, p. 18.

[57] H Marichelle, La Parole (Paris, 1897)

phonographic recordings of material that used the syllable as the basic unit and paid much attention to the part played by the consonant and vowel in the syllable. His work was followed by Herlin who developed the "Belgian method," "La méthode globale" or syllable method of teaching the deaf.[58] G. Sibley Haycock in England, following the same idea as Marichelle and Herlin, published The Teaching of Speech in 1933.[59] It was also designed to teach the deaf to speak, but it is a truly interesting challenge to all foreign language teachers. In the "introduction" of Section I, "Natural Speech," he indicated that "it has to be admitted that the speech of the deaf-born child is, as a general rule, lacking in the quality of naturalness. That deaf children who have never heard the human voice engaged in conversation can be taught to speak quite like hearing people is, in the opinion of the writer, a proposition impossible of realization; nevertheless, he is convinced that, granted certain conditions, it is possible to train deaf children to speak with a degree of naturalness much greater than is at present attained."[60]

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[58] Stetson indicated: "Grammont, Sapir and his students, Sommerfelt, Fouche, all have followed such a trend" (cf. Bases of Phonology, pp. 17-18).

[59] G Sibley Haycock, The Teaching of Speech, 3rd ed. (Washington, D. C., 1942).

[60] Haycock, p. 15.

He suggested some methods for breath-control and the cultivation of the voice concerning natural speech; then he showed the general rules in terms of the structure of syllables which can teach the children to speak with quite natural "accent," rhythm, pronunciation, rate of utterance, and intonation. In the next two sections, "Speech Sounds" and "Intelligible Speech," he also made many good points for teaching based on the nature of the syllable. Stetson's comment on this book is interesting: "It is more scientific than the conventional British manuals of phonology."[61]

However, on the other hand, since the so-called "Army method"[62] destroyed the myth of the "Coleman Report"[63] during the Second World War, the old-fashioned method of teaching foreign language, stressing the "reading aim," seemed doubly discredited. Along with the inventions of audio-visual aids, there has been a revolutionary change in foreign language teaching; the audio-lingual method and the language laboratory have been developed and adopted in most language teaching programs, and several English language institutes and teachers have also done some valuable work based on the new dimensions of linguistic research. After the publication of The Intonation of American English by Pike, a strong tendency to stress the prosodic features of speech in teaching has emerged. One of the important books dealing with English language teaching based on Pike's work is Charles C. Fries's Teaching and Learning English as a Foreign Language.[64] In Chapter II, "The Sounds: Understanding and Producing the 'Stream of Speech.'" he pointed out that the differences of speech tune and rhythm between English and native language contribute to the difficulties of recognition and production. It is necessary to

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[61] Stetson, p. 18.

[62] It is the language teaching method developed by linguists for Army Specialized Training Program during the Second World War. It is characterized by imitation and memorization of basic conversational sentences as spoken by native speakers, description of the distinctive elements of intonation, pronunciation, morphology, and syntax on the basis of the sentence memorized; and massive practice in speaking and listening.

[63] Cf. William R. Parker, The National Interest and Foreign Language (Washington, D. C., 1962), p. 87: "Language teachers organized in 1924 a long-term investigation known as the 'Modern Foreign Language Study,' supported by a series of grants from the Carnegie Corporation. This was an attempt to analyze the current situation, particularly in high schools, and to discover remedies. It was essentially an elaborate research project and produced more than a dozen books, the most read and most controversial of which was known to the profession as the "Coleman Report." Research had shown Coleman that 83 percent of American high school pupils studied a foreign language for only 2 years and that most college language

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requirements embraced 2 years or less. With so little instruction, neither in America nor in any other country could students acquire a meaningful proficiency in speaking and comprehending and writing and reading a foreign language. Of all these skills, the one most attainable in the time to which language instruction seemed forever restricted was, in Coleman's judgement, the ability to read." (Cf. also Algernon Coleman, Experiments and Studies in Modern Language Teaching [Chicago, 1934])

[64] Charles C. Fries, Teaching and Learning English as a Foreign Language (Ann Arbor, 1946)

have a descriptive analysis of the "covering patterns" (the patterns of intonation and of rhythm) which furnish the general frame in which the separate segments are used.[65] In the Appendix, he presents a section entitled "Step by Step Procedure for Marking Limited Intonation with its Related Features of Pause, Stress and Rhythm."[66] Of all the books which the author consulted, this one has the best design for the teaching of the prosodic features with some attention given to the structure of syllables. Following Robert Lado's Linguistics Across Cultures,[67] the contrastive analysis approach to teaching foreign language has been widely used. Dozens of foreign or second-language teaching books generally emphasizing the analysis of the prosodic features of language based on the contrastive study have been published. Language Teaching by Lado[68] is a typical representative. Hill's The New Linguistic Method[69] is the most valuable and thorough discussion of the prosodic features of English language with drill materials especially designed for the Chinese English teachers.

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[65] Fries, p. 20.

[66] Fries, pp. 62-74.

[67] Robert Lado, Linguistics Across Cultures (Ann Arbor, 1957).

[68] Robert Lado, Language Teaching (New York, 1964).

[69] Archibald A. Hill, The New Linguistic Method (Taipei, Taiwan, China, 1964).

The author has looked through approximately forty textbooks and found that none of them use syllable analysis as a means of teaching English as a foreign language. Some of them do, however, use the syllable in teaching spelling.

1.5 Method of Investigation

Charles C. Fries says that "The most effective materials are those that are based upon a scientific description of the language to be learned, carefully compared with a parallel description of the native language of the learner."[70] This is what linguists call contrastive analysis, and is being accepted by most linguists and language teachers as an operative axiom. This study also will use the above assumption as part of its groundwork since the purpose of this study is to deal with the process of language teaching. For a scientific description of both English and Mandarin phonology, the observation and formulation will be based on earlier publications; however, the author's own observations are likewise desirable since he is a native speaker of Mandarin and has worked in the field of education for many years as a teacher and administrator. The application of contrastive analysis to language teaching will be directed toward a comprehensive understand both of sound systems being learned and the learning processes used by the pupil.

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[70] Fries, p. 9.

Since the author regards polysyllabic words as a succession of monosyllables, in a contrastive analysis of the syllable structures of both languages, it is proper that the study should begin with the monosyllable. By means of an investigation of the distribution of phonemes in syllables, permissible clusterings of vowels and consonants will be determined and the basic types of monosyllables with their permissible prosodic features (stress, length, and pitch) will be formulated. This study will appear in Chapter II. Chapter III will present an investigation of polysyllabic words with the analysis of the structure of monosyllables serving as a basis for the description of the prosodic features of polysyllables. The sources of data for the syllable analysis will be Edward L. Thorndike and Irving Lorge's The Teacher's Word Book of 30,000 Words[71] and John S. Kenyon and Thomas A. Knott's A Pronouncing Dictionary of American English. The next important task, the production of these syllables in the natural speech, constitutes the major part of Chapter III. For this study, in addition to the foregoing observation and formulations, the investigation will use native informants who will serve as juries in order to test the author's hypotheses about the prosodic features of both languages.

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[71] E. L. Thorndike and I. Lorge, The Teacher's Word Book of 30,000 Words (New York, 1944)

The final chapter will show how the rules and statements about the distinguishing characteristics of the sound systems should be used in designing instructional materials for the classroom. Some attention will be given to sources of linguistic interference for the native speaker of Mandarin as he learns English.

CHAPTER II

THE SYLLABLE STRUCTURE OF THE TWO LANGUAGES: MONOSYLLABLES

2.1 The Basic Structure of the English Monosyllable

2.11 Syllabic Phonemes

As mentioned in Chapter I, this study will begin with the monosyllable. The reason for this is not only that polysyllabic words can be treated as a succession of monosyllables, but also that the great majority of English words are monosyllabic;[1] even more important, the latter are actually used more frequently than polysyllabic words. In studying the structure of a language, it is important to remember that the significance of word-types depends not only on their number but on the frequency of their occurrence in actual speech as well.

Generally speaking, the fundamental structure of the monosyllable is governed by the phonotactics of the concatenation of vowels and consonants, which basically is a linking of syllabic and nonsyllabic phonemes within minimal sequences of speech. Since the syllabic phoneme, all linguists would agree, is the nucleus of the syllable, it is proper that the first step taken should be the analysis of the syllabic phoneme.

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[1] Cf. Otto Jespersen, Monosyllabism in English (London, 1928), pp. 1-18.

In English vowels and diphthongs are always syllabic, and some consonants can also be syllabic in certain prosodic environments. There seems to be very little agreement among linguists as regards the number of vowels and diphthongs that are "phonemic."[2] This disagreement, however, results from the fact that the various systems of classification are based on different theoretical constructs and thus are different more in appearance than in fact

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[2] In early times, Jones and Bloomfield proposed a system of eight cardinal vowels /i e ɛ a ɑ ɔ o u/. In 1941, B. Bloch and G. L. Trager, following previous suggestions by Henry Sweet and Prince Nicholas Troubetzkoy, proposed a system of six simple vowels /i e a o ə u/ and eighteen diphthongs (cf. *Outline of Linguistic Analysis* [Baltimore, 1942], and "The Syllabic Phonemes of English," *Language* XVII [1941], 225-245). This system of six vowel phonemes, later on, was accepted by R. Jakobson, C. G. M. Fant and M. Halle, for British Received Pronunciation in *Preliminaries to Speech Analysis*, p. 43. However, in 1951, George Trager and Henry Lee Smith Jr. produced a system of nine simple vowels /i e æ ɨ ə a u o ɔ/ and twenty-seven diphthongs (cf. *Outline of English Structure*). Known to American phonologists as the "over-all pattern," this system induced widespread comment, ranging from severe disagreement to very sympathetic acceptance. Many scholars, notably James H. Sledd, have shown that this system must be expanded by at least a tenth vowel as a system of ten vowels /i e æ a ɑ ə ɨ ɔ o u/ (cf. Sledd's *Short Introduction to English Grammar* [Chicago, 1959], pp. 45-57). Hill, in a paper: "A Pedagogical Notation Based on Trager-Smith Phonemics," reduced the system of nine (or ten) simple vowels to seven /I ɛ æ ə a ɔ U/. However, other scholars such as Kenyon (*American Pronunciation*, 10th ed. [Ann Arbor, 1951]) and Charles K. Thomas (*An Introduction to the Phonetics of American English*, 2nd ed. [New York, 1958]) follow the IPA system in attempting to treat the phonemes of English and their allophonic variants. Fries (*Teaching and Learning English as a Foreign Language*) and Pike (*Phonemics*) adopt systems of vowel phonemes similar to those found in Kenyon and Thomas. Clifford H. Prator, Jr., in his *Manual of American English Pronunciation* (Los Angeles, 1957), also following the IPA system, but with slight modifications, proposes a system of eleven

2.111 Syllabic vowels

The author in this study, following the "IPA-Kenyon-Pike" scheme,[3] uses the system of eleven simple vowels. The reasons for this choice are, first, because it is the most common in teaching English as a foreign language;[4] second, it is a practical one, since Kenyon and Knott's Pronouncing Dictionary of American English is the most complete pronunciation book of an American type available in the Republic of China.

In describing the features which distinguish vowels from one another in English, most linguists would agree that there are only three (or only two): (a) the place at which the principal narrowing of the oral passage occurs (front,

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simple vowels and eight diphthongs for the purpose of learning English as a foreign language. (Also cf. Arthur J. Bronstein, The Pronunciation of American English [New York, 1960], Appendix B, pp. 311-316).

[3] It is based on the International Phonetic Alphabet as adapted to American English by John S. Kenyon and Kenneth L. Pike (also cf. Robert A. Hall, Jr., Sound and Spelling in English [New York, 1961], p. 8).

[4] There are several valuable books using the system of eleven vowels, such as Anne Cochran and Yu K'eng Lin, English Pronunciation for Chinese Students (Taipei, 1964); Mary Finocchiaro, English as a Second Language (New York, 1964); and Prator. Cochran and Lin use the Trager-Smith symbols, but their analysis is essentially the eleven-vowel system.

central, back); (b) the height of the tongue (high, mid, low); and (c) the tension of the tongue muscles (tense or lax). However, in teaching English as a foreign language, particularly for Chinese speakers, a satisfactory description of a vowel sound must account for three more features which may be considered redundant in some American vowels, because these features are very likely to cause trouble in the producing of vowel sounds. They are the degree of lip rounding, the degree of jaw opening and durational length. These will be discussed in Chapter IV.

The eleven simple vowels of American English can be arranged on a chart that roughly indicates their position in regard to the criteria discussed above. For the sake of this study the chart must include certain criteria that usually do not appear in descriptions of American English--namely, those which are likely to be troublesome for speakers of Chinese.

A look at Table I shows that these eleven simple vowels have their own distinguishing features. Their key words are given in Table II.

TABLE I

VOWEL PHONEMES OF AMERICAN ENGLISH[5]

	Lips:				Rounded
	Tongue (position) (height)		Front	Central	Back
Jaw Closed	High	Tense	i		u
		Lax	I		U
	Mid	Tense	e		o
		Lax	ɛ	ə	
	Low	Tense			
Jaw Open		Lax	æ	a	ɔ

TABLE II

THE KEY WORDS OF ENGLISH VOWEL PHONEMES

Phonemic Symbol	Key Word
Front vowels	
/i/	beat
/I/	bit
/e/	bate
/ɛ/	bet
/æ/	bat

---

[5] This table is based on Kenyon's analysis of the vowels of American English (cf. Kenyon, pp. 81-124).

Back Vowels	
/u/	boot
/U/	book
/o/	boat
/ɔ/	bought
Central Vowels	
/a/	hot
/ə/	but

2.112 Diphthongs

A diphthong, by definition, is a vocalic glide or complex nucleus within the limits of a single syllable.[6] In such a diphthongal glide, the first element (vowel) is the syllabic center, the second element being regarded as non-syllabic. Note that such adjacent vowels as those in react [ri-ækt] and idiom [IdI-əm] are not diphthongal, since the syllabic division separates the two elements and prevents a gliding motion from one to the other.

There are many and various diphthongs and triphthongs to be found in the various dialects of American English. However, some of them have wide distribution but are not phonemic, such as [Ii], [eI], [ou], [Uu];[7] others are relatively rare, such as [æI], [æu], [Ui], [əI].[8] The most common diphthongs which all schools of analysis recognize as existing in American English may be said to consist of a simple vowel followed by an /I/ or /u/. They can be arranged as in Table III.

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[6] The Trager-Smith analysis treats the diphthong (complex nucleus) as a sequence of a simple vowel plus one of the three glides (semi-vowels): /w y h/; cf. Chapter I, Review. However, in this study, the author, following the system of the IPA-Kenyon-Pike, regards it as a combination of two vowels representing the complex nucleus.

TABLE III

DIPHTHONGS OF AMERICAN ENGLISH

	-I	-u
a	aI	au
ɔ	ɔI	

Their descriptions and key words for them can also be given in the following table:

TABLE IV

PHONETIC DESCRIPTION OF DIPHTHONGS OF AMERICAN ENGLISH

Phonemic Symbol	Phonetic Description	Key Word
/aI/	vocalic gliding from [a] to [I]	bite
/au/	vocalic gliding from [a] to [u]	bough
/ɔI/	vocalic gliding from [ɔ] to [I]	boy

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[7] That is, they are not meaningfully distinct from the monophthongs [i], [e], [o], and [u]. (Cf. Charles K. Thomas, *An Introduction to the Phonetics of American English* [New York, 1958), p. 141).

[8] Cf. Hill, "A Pedagogical . . . ," 8.

2.113 Syllabic Consonants

In the structure of English syllables, a few consonants, called syllabic consonants, can also assume a particular function of vowels; that is, they can act as the nucleus of the syllable They are three nasals [m], [n], [ŋ], the lateral and retroflex resonants [l], [r].[9] They all tend to be syllabic nuclei by themselves after certain consonants without intervening vowel sounds. Among them [l] is the most frequent. After the consonants [t], [d], [n], [s], [z], especially in final position, [l] may form a syllable by itself, since it has the vowel-like quality of sonority. [n] is also often syllabic, especially in rapid speech after [t] or [d]. Syllabic [m] occurs less frequently than syllabic [n]. [ŋ] is occasionally syllabic as a variant of syllabic [n] after [k] or [g] in rapid speech. Transcriptions and example words are given in Table V.[10]

From Table V, an important generalization is that the syllabic consonants as a whole, in the syllable structure, chiefly occur finally after a consonant or between two

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[9] Bloch and Trager indicate that almost any consonant may on occasion be syllabic. A syllabic [s] appears in the interjection *pst*; and in a common relaxed pronunciation of *Howdy do* [hawd duw], the first [d] often constitutes a separate syllable (cf. *Outline*, p. 28).

[10] Cf. Thomas, pp. 101-105; also Kenyon, pp. 47, 55, 98.

TABLE V

PHONETIC TRANSCRIPTION OF SYLLABIC CONSONANTS OF AMERICAN ENGLISH

Phonemic Symbol	Phonetic Transcription	Example Words
/m/	[m̩]	bottom [bɑtm̩] schism [sIzm̩] slap him [slæpm̩]
/n/	[n̩]	button [bɑtn̩] hidden [hIdn̩] ribbon [rIbn̩] bread and butter [brɛdn̩bɑtə]
/ŋ/	[ŋ̩]	I can go [aIkŋ̩go]
/l/	[l̩]	apple [æpl̩] beetle [bitl̩] funnel [fɑnl̩] missile [mIsl̩]
/r/	[r̩]	learner [lr̩nr̩]

consonants, and occur less often before a vowel. Thus, they can occur only in weakly stressed syllables.[11]

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[11] Prator uses a simple formula to describe the occurrence of syllabic consonants:

$$\left.\begin{matrix}t\\d\\n\end{matrix}\right\} + \text{unstressed syllable containing} \left\{\begin{matrix}l\\n\end{matrix}\right\rangle \text{syllabic consonant.}$$

Cf. Prator, p. 85. However, this formula is an imcomplete statement, because it leaves out the syllables /m/, /ŋ/, and /r/.

2.12 Non-syllabic Phonemes

There are two kinds of nonsyllabic sounds: consonants and semivowels.[12] The descriptions of these nonsyllabic phonemes can be tabulated as in Table VI.[13]

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[12] The semivowels usually are listed as the three phonemes /y, w, h/. Bloch and Trager were the first linguists who treated /h/ as a semivowel (cf. Bloth and Trager, 239-241). Semivowels are like the vowels in the position in which they are pronounced, but they are like consonants in that they are pronounced with audible friction. Here, the author uses the term "glide" for them, since /y/, sometimes written with the letter "j," is a voiced gliding movement from a mid or high front unround position to the position of a following vowel; and /w/ is a voiced gliding of the lips from a slightly rounded position to the lip position for the following vowel. The /h/ is not used in this analysis for two reasons: Bloch and Trager use it along with the /w/ and /y/ only in what are being regarded here as tense vowels, and the use of this symbol would cause the speaker of Chinese to confuse it with the glottal fricative. In the syllable structure, these semivowels are all non-syllabic.

[13] This table is based to a large extent on the analysis of A. A. Hill in his Introduction to Linguistic Structure (New York, 1958), pp. 36-39, 71). Since there is a general agreement among phonemicists as regards the twenty-four nonsyllabic phonemes in English, there is no confusion in the matter of which system of analysis one follows. For convenience in discussing consonant clusters, the author follows the system of phonemic symbolization of Trager-Smith, instead of IPA-Kenyon-Pike. The main reason for choosing single symbols for the apico-palatals is that in the Romanized transcriptions used in Chinese schools single symbols are used in describing fricatives and affricates that will be used as means of comparison when these English sounds are taught.

TABLE VI

NON-SYLLABIC PHONEMES OF AMERICAN ENGLISH

		bilabial	labio-dental	inter-dental	apico-alveolar	apico-palatal	velar	glottal
stops	voiceless	p			t		k	
	voiced	b			d		g	
affricates	voiceless					č		
	voiced					ǰ		
fricatives	voiceless		f	θ	s	š		h
	voiced		v	ð	z	ž		
resonants	nasal	m			n		ŋ	
	lateral				l			
	retroflex				r			
glides (semivowels)						y	w	

2.13 Phonotactics

2.131 The Patterns of the Syllable Structure

A brief review of the previous investigation shows that there are nineteen syllabic phonemes (11 simple vowels, 3 diphthongs and 5 syllabic consonants) and twenty-four non-syllabic phonemes in American English. All the syllables of the English language are distributions or combinations of such phonemes. Since every syllable must have a syllabic phoneme identifying it, the simplest and the most basic pattern of the monosyllable structure is a single syllabic phoneme such as /e/ (the indefinite article). However, in any given language, the patterns of monosyllables appearing in actual speech are much more complex than the above. Usually a monosyllable consists of a syllabic phoneme as the central part with non-syllabic phonemes as optional initial and terminal parts. A closer investigation of the occurrence of such monosyllables shows that there are four fundamental patterns. Using the "S" for the syllabic phoneme and "N" for the non-syllabic phoneme, the four fundamental patterns may be expressed as follows:

TABLE VII[14]

PATTERNS OF SYLLABLE STRUCTURE

Initial Prevocalic Onset	Vocalic Peak	Final Postvocalic Coda
	S	
N ⁀	S	
	S ⁀	N
N ⁀	S ⁀	N

---

[14] "⁀" is the sign for concatenation.

In this analysis the N and S can be used to refer to clusters as well as to single phonemes. Since by definition the syllabic is a vowel, a diphthong, or a syllabic consonant, and since these cannot occur together without an intervening nonsyllabic or a syllabic boundary, neither more nor less than one syllabic can occur in a given syllable. The nonsyllabic portions of the syllable can consist of either single consonants or clusters, with maximum clusterings of three nonsyllabics in initial position and four in final position. Permissible sequences in these clusters will be discussed below. The following rule is a succinct statement of the structure of the syllable as described here.[15]

$$\text{Monosyllable Structure} \longrightarrow N_0^3 \frown S \frown N_0^4$$

2.132 The Structure of Nonsyllabic Phonemes

From the above equation, it is easily learned that nonsyllabic phonemes which occur either in initial (prevocalic) or in final (postvocalic) position display the characteristic of various combinations. However, the patterns of such combinations are very restricted, with the restrictions increasing with the number of nonsyllabics in the cluster.

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[15] "$\longrightarrow$" means rewrite. The subscript is the minimum number of phonemes; the superscript, the maximum number of phonemes.

There are some generalizations drawn by linguists about it, as follows:[16]

2.1321 Initial (Prevocalic) Nonsyllabics

a. Zero Initial

Zero initial is possible before all syllabic vowels except /U, Uə/.[17]

b. Single Initial

The only nonsyllabics that do not occur singly in initial position are /ŋ/ and /ž/.

c. Initial Cluster

There are two kinds of initial clusters, the two-element clusters and three-element clusters. Since the former has more freedom of occurrence than that of the latter according to the principle of the limitation on the nonsyllabic occurrence mentioned above, the former shall be treated first here. Generally speaking, there are forty combinations of two-element initial cluster which are native, frequent, and well established.[18] They can be tabulated in terms of their sound types as in Table VIIIa.[19]

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[16] There have been several thorough discussions on the clusters of English monosyllables. The most valuable generalizations drawn from these discussions on which the present study is based are from: Bloomfield, p. 131; Kemp Malone, "The Phonemic Structure of English Monosyllables," American Speech (1936), 212-218; O'Connor and Trim, pp. 116-122; Hill, Introduction, pp. 70-84; and Fries, pp. 17-19.

[17] Cf. O'Connor and Trim, p. 116. The occurrence of /U/ and /Uə/ in initial position is very restricted. /U/ is found initially in certain interjections and in proper names of foreign origin such as Uruguay, Urumiah. /Uə/ seems to occur initially only in proper names of foreign origin such as Ur, Urdu.

TABLE VIIIa

THE COMBINATIONS OF INITIAL CLUSTERS

2nd member / 1st member		Stops		Affricates		Fricatives		Nasals	Lateral	Nonlateral (retroflex)	Glides
		vl	vd	vl	vd	vl	vd				
Stops	vl								pl- kl-	pr- tr- kr-	(pw-) py- tw- ty- kw- ky-
									bl- gl-	br- dr- gr-	(bw-) by- dw- dy- (gw-) (gy-)
Affricates	vl										čy-
	vd										ǰy-
Fricatives	vl	sp- st- sk-				sf-		sm- sn-	fl- sl- (šl-)	fr- θr- šr-	fw- fy- sw- θy- (šw-) sy- hw- hy-
	vd								(vl-)	(vr-)	(zw-) vy-
Nasals											(mw-) my- (nw-) ny-
Lateral											ly-
Nonlateral (retroflex)											
Glides											

---

[18] There are rare occurrences of other clusters in borrowed words, as /pw-/ in pueblo, /bw-/ in bwana, /mw-/ in moire, /nw-/ in noire, /šl-/ in Schlitz, /šw-/ in schwa, /vl-/ in Vladivostok, /vr-/ in Vries and /zw-/ in Zouave; all are infrequent, limited to foreign forms or proper names. Also the /gw-/ and /gy-/ are very rare.

[19] This table is based on the analyses of Hill, pp. 70-77, and O'Connor and Trim, p. 117. For the sake of completeness the "borrowed" clusters mentioned above are included in the table. They appear in parentheses.

TABLE VIIIb

KEY WORDS

			play /ple/ clay /kle/	pray /pre/ tray /tre/ cream /krim/	twin /twIn/ quick /kwIk/	pure /pyur/ tube /tyub/ cute /kyut/
			black /blæk/ glad /glæd/	brown /braUn/ drip /drIp/ great /gret/	dwell /dwɛl/	butte /byut/ due /dyu/
						chew /čyu/ Jew /ǰyu/
span /spæn/ stay /ste/ skin /skIn/	sphere /sfIr/	smell /smɛl/ snow /sno/	fly /flaI/ sleep /slip/	free /fri/ throw /θro/ shrink /šrInk/	thwack /θwæk/ sweet /swit/ where /hwɛr/	few /fyu/ suit /syut/ huge /hyuǰ/
						view /vyu/
						mute /myut/ new /nyu/
						lute /lyut/

Looking at the above tables, it is easily found that there are a number of peculiarities existing in the clusters of two nonsyllabic phonemes. First, the most frequent occurrence of such a combination is one consisting of the glide (semivowel) /-y/ as the second member with one of the stops, fricatives, nasals or the lateral. A more interesting feature of these combinations is that such a glide /-y/ is followed only by the syllabic phoneme /u/, forming /-yu-/ (or /-ju-/) as a syllabic unit in the syllable structure. Consequently, linguists like Hill treat this /-y-/ as the initial part of a diphthongal syllabic /-yu-/, as in /byu-/ (beauty), /dyu-/ (dew), /myu-/ (music), /vyu-/ (view) and so on.[20] O'Connor and Trim pointed out that combinations of the types /Cy/ (single nonsyllabic plus /y/) and /CCy/ (two nonsyllabics plus /y/) have a particularly restricted distribution and cannot therefore be regarded as compound consonant units (two or three nonsyllabic phoneme clusters) in the same way. They are moreover followed only by /u/ and /Uə/. The groups /yu/ and /yUə/ are thus freely combinable with a wide range of simple and compound consonant units.[21] The author, therefore, will treat it as a diphthong in the syllable structure. However, in classroom discussions of the English initial clusters, such combinations as /by-/, /dy-/, ... must be pointed out as a special structure of the English initial clusters.

Secondly, the two affricates č, ǰ/ and the two voiced fricatives /ð, z/ occur as initial single consonants but never as a member of an initial cluster. The six stops /p, t, k, b, d, g/ and the five voiceless fricatives /f, θ, s, š, h/ most of the time tend to be the first member of two-nonsyllabic clusters, whereas the nasals /m, n/, the lateral /l/, the retroflex /r/ and the glides /w, y/ often appear in the position of second member. Exceptions to this rule are that the three voiceless stops /p, t, k/ and the voiceless /f/ sometimes come after the voiceless fricative /s/; and the nasals /m, n/ and the lateral /l/ can come before /y/.

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[20] Hill, *Introduction*, pp. 73-75.

[21] O'Connor and Trim, p. 117.

As for the clusters of three nonsyllabics, there are only seven combinations for most American English speakers, namely:[22]

/spl-/		
/spr-/	/str-/	/skr-/
/spy-/		/sky-/
		/skw-/

It is easily seen from the above list that these seven combinations of three-nonsyllabic clusters are just the seven two-nonsyllabic clusters /pl-/, /pr-/, /tr-/, /kr-/, /py-/,

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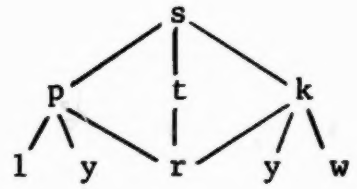
[22] This list is adopted from Hill's analysis. He originally points out that, besides these seven, two more, /skl-/ and /sty-/ can be found in the initial position of English syllables. However, the former is very rare and is practically limited to learned and foreign words like sclerosis and its derivatives. The latter often exists only as a variant of /stu-/ (cf. Hill, Introduction, pp. 70-71).

/ky-/, and /kw-/; each coming after the fricative /s/. These combinations can be formulated into the following diagram.[23]

TABLE IX

DIAGRAM OF THREE-NONSYLLABIC INITIAL CLUSTERS



2.1322 Final (Postvocalic) Nonsyllabics

a. Zero Final

Zero final is possible with all syllabics except /I, ɛ, æ, U/.

b. Single Final

Twenty-one nonsyllabic phonemes except the voiceless glottal fricative /h/ and semivowels /y w/, may occur as a single final.[24]

c. Final Cluster

Since the most common inflections in English consist of single nonsyllabics, the structure of final clusters in English presents a more complex picture than that of initials.

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[23] This diagram is adopted from O'Connor and Trim with some modification (cf. O'Connor and Trim, p. 116)

[24] Cf. Chapter I, p. 22 for the treatment of diphthongs which Trager and Smith transcribe as /iy/, /ow/, etc.

Generally speaking, there are five inflectional morphemes: /z, s, d, t, θ/ which usually occur as suffixes under different morphological and phonological rules.[25] In order to make such rules very clear to language learners, it is better to classify the final clusters into two categories: one is the kind of cluster without a suffix, that is, free morphemes only; the other, with suffix, that is, with bound inflectional morphemes added.[26]

(1) Final Cluster without Suffix[27]

There are two kinds of final clusters which occur freely without bound morphemes added, namely: the two-nonsyllabic clustering and three-nonsyllabic clustering. Just as in the occurrences of initial clusters, the fewer nonsyllabics the finals contain, the more frequently they occur. Roughly speaking, there are fifty combinations of final clusters consisting of two nonsyllabics, as in Table Xa.

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[25] The morpheme /θ/, as Fries points out, is not now a live or productive pattern. It does not behave in the same pattern as the other bound morphemes /s z t d/. Therefore, Fries treats the final clusters with /θ/ as a single free morpheme group. The author, for teaching the morphological rules, regards it as a bound inflectional morpheme.

[26] Most linguists deal with the structure of final clusters as a whole regardless of suffixes; that is, the final clusters involving added suffixes are not treated separately from those of other finals without suffixes. One exception is Fries's treatment in his Teaching and Learning English as a Foreign Language (pp. 18-20).

[27] Cf. Fries, pp. 18-20; Yi-chin Fu, The Phonemic Structure of English Words (Taipei, 1963), pp. 39-67.

TABLE Xa

The Combination of Two-nonsyllabic Final Clusters Without Suffixes

1st member \ 2nd member		Stops		Affricatives		Fricatives		Nasals	Lateral	Nonlateral (Retroflex)	Glides
		vl	vd	vl	vd	vl	vd				
Stops	vl	-pt -kt				-ps -ts -ks					
	vd						-dz				
Affricates	vl										
	vd										
Fricatives	vl	-sp -st, -ft -sk									
	vd										
Nasals		-mp -nt -ŋk	-nd	-nč	-nǰ	-mf -ns	-mz -nz				
Lateral		-lp -lt -lk	-lb -ld	-lč	-lǰ	-lf -ls -lš	-lv -lz	-lm -ln			
Nonlateral (Retroflex)		-rp -rt -rk	-rb -rd -rg	-rč	-rǰ	-rf -rs -rš	-rv -rz	-rm -rn	-rl		
Glides											

TABLE Xb

Key Words

apt /æpt/ act /ækt/				copse /kaps/ blitz/blIts/ box /baks/			
					adze /ædz/		
grasp/græsp/ best /bɛst/ lift /lIft/ task /tæsk/							
lamp /læmp/ tent /tɛnt/ bank /bæŋk/	band /bænd/	bench /bɛnč/	change/čenǰ/	nymph /nImf/ tense /tɛns/	almz /amz/ lens /lɛnz/		
help /hɛlp/ belt /bɛlt/ milk /mIlk/	bulb /balb/ cold /kold/	belch /bɛlč/	bulge /bəlǰ/	self /sɛlf/ else /ɛls/ Welsh /wɛlš/	solve /salv/ gules/gIulz/	film/fIlm/ kiln/kIln/	
harp /harp/ heart /hart/ lark /lark/	barb /barb/ third/θərd/ berg /bərg/	church/čərč/	merge /mərj/	surf /sərf/ horse /hɔrs/ harsh /harš/	serve /sərv/ furze /fərz/	warm/wɔrm/ barn/barn/	pearl/pərl/

Looking at Table Xa, it is easily seen that there are also a number of peculiarities existing in the combinations of two-nonsyllabic final clusters. First, the two affricates /č, ǰ/, which never occur as members of initial clusters, do appear in the final clusters, and always come after /n/, /l/ and /r/.

Secondly, the most interesting phenomenon that occurs in the combination of final clusters is that the position in which the nonsyllabic appears tends to be in a converse direction from that of initial clusters; that is, the nasals /m, n/, lateral /l/ and retroflex /r/, which most of the time occur as the second member of two-nonsyllabic initial clusters, all tend to be the first member of two-nonsyllabic final clusters; at the same time the stops /p t k b d g/, affricates /č, ǰ/ and fricatives /f, s, š, v, z/, the first members of two-nonsyllabic initial clusters, always occur as the second member of the same kind of final clusters. When the final clusters combine the nasals /m, n/ with the lateral /l/ or with the retroflex /r/, the latter come before the former; in addition, in the combination of /l/ and /r/, the /r/ comes before the /l/.

Thirdly, the clusters of three voiceless stops /p, t, k/ with fricative /s/ present two ways of combining; that is, the fricative /s/ can either come after three voiceless stops or before them. Besides, there are two final clusters which are stops combining with stops, /-pt, -kt/; such combinations never occur in initial clusters. Such a comparison of the two-nonsyllabic final clusters without suffixes with the two-nonsyllabic initial clusters can be shown in following Table XI.

In the three-nonsyllabic final clusters, there are eleven frequent combinations in English; like the three-member initial clusters, they can be described as a combination consisting of a limited number of pairs of nonsyllabics followed by an even more limited number of single consonants, as follows:

TABLE XIIa

THE COMBINATIONS OF THREE-NONSYLLABIC FINAL CLUSTERS WITHOUT SUFFIXES

third member two-member clusters	Stops		Fricatives		
	vl	vd	vl		vd
	-t	-d	-s	-θ	-z
-ks	-kst				
-mp	-mpt		-mps		
-nt			-nts		
-ŋk			-ŋks	-ŋkθ	
-lt			-lts		
-rp			-rps		
-rt			-rts		
-rs	-rst				
-rl		-rld			

TABLE XI

Comparison of Two-nonsyllabic Initial Clusters with Those of Final Clusters without Suffixes

		Stops		Affricatives		Fricatives		Nasals	Lateral	Nonlateral (Retroflex)	Glides
		vl	vd	vl	vd	vl	vd				
Stops	vl	-pt -kt				-ps -ts -ks			pl- kl-	pr- tr- kr-	(pw-) py- tw- ty- kw- ky-
	vd						-dz		bl- gl-	br- dr- gr-	(bw-) by- dw- dy- (gw-) (gy-)
Affricates	vl										
	vd										
Fricatives	vl	-sp -st -ft -sk				sf-		sm- sn-	fl- sl- (sl-)	fr- θr- šr-	θw- fy- sw- y- (sw-) sy- hw- (gy-)
	vd								(vl-)	(vr-)	(zw-) vy-
Nasals		-mp -nt -nk	-nd	-nč	-nǰ	-mf -ns	-mz -nz				(mw-) my- (nw-) ny-
Lateral		-lp -lt -lk	-lb -ld	-lč	-lǰ	-lf -ls -ls	-lv -ls	-lm -ln			ly-
Nonlateral (Retroflex)		-rp -rt -rk	-rb -rd -rg	-rč	-rǰ	-rf -rs -rš	-rv -rz	-rm -rn	-rl		
Glides											

*Initial clusters are to the right of the diagonal line; final are to the left. The boxed set /-sp-, -st-, -sk-/ can be either.

TABLE XIIb

KEY WORDS

next /nɛkst/			
tempt /tɛmpt/		glimpse /glɪmps/	
		chintz /čɪnts/	
		sphinx /sfɪnks/	length /lɛŋkθ/
		waltz /wɔlts/	
		corpse /kɔrps/	
		quartz /kwɔrts/	
first /fərst/			
	world /wərld/		

Interestingly enough, as seen in the above table, even these three-nonsyllabic final clusters which occur in free morphemes all end with /t, d, s, θ/.

(1) Final cluster with suffix

It is obvious that the addition of suffixes: /t, d, s, z, θ/ to the end of finals must expand the scope of nonsyllabic clusters. There are forty-four two-member final clusters. Each basically combines a single final with one of the five bound inflectional morphemes /t, d, s, z, θ/, as in Table XIII a.

TABLE XIIIa

COMBINATIONS OF SINGLE FINALS WITH SUFFIXES

Single Finals		Suffixes	Stops		Fricatives		
			vl	vd	vl		vd
			-t	-d	-s	-θ	-z
Stops	vl	-p	-pt		-ps	-pθ	
		-t			-ts	-tθ	
		-k	-kt		-ks		
	vd	-b		-bd			-bz
		-d				-dθ	-dz
		-g		-gd			-gz
	vl	-č	-čt				
	vd	-ǰ		-ǰd			
Frica-tives	vl	-f	-ft		-fs	-fθ	
		-θ	-θt		-θs		
		-s	-st				
		-s	-st				
	vd	-v		-vd			-vz
		-ð		-ðd			-ðz
		-z		-zd			
		-ž		-žd			
Nasals		-m		-md			-mz
		-n		-nd		-nθ	-nz
		-ŋ		-ŋd		-ŋθ	-ŋz
Lateral		-l		-ld		-lθ	-lz
Retroflex		-r		-rd		-rθ	-rz

TABLE XIIIb

KEY WORDS

hoped /hopt/ talked /tɔkt/		sleeps /slips/ rats /ræts/ breaks /breks/	depth /dɛpθ/ eighth /etθ/	
	rubbed /rəbd/ begged /bɛgd/		width /wIdθ/	cabs /kæbz/ reads /ridz/ figs /fIgz/
laughed /læft/ breathed /briθt/ passed /pæst/ washed /wašt/		coughs /kɔfs/ wreaths /riθs/	fifth /fIfθ/	
	moved /muvd/ seethed /siθd/ raised /rezd/ rouged /ružd/			lives /lIvz/ breathes /briθz/
	combed /komd/ canned /kænd/ thronged /θrɔnd/		tenth /tɛnθ/ strength /strɛŋθ/	rooms /rumz/ runs /rənz/ rings /rIŋz/
	called /kɔld/		health /hɛlθ/	calls /kɔlz/
	stirred /stərd/		fourth /fɔrθ/	stirs /stərz/

As with the other three-member clusters, those in final positions with a suffix can also best be described as consisting of a limited number of two-member clusters followed by an even smaller number of suffixes. The seventy-three such clusters are shown in Table XIV a.

A comparison between the structure of two-member final clusters without suffixes as in Table Xa and that of two-member final clusters with suffixes as in Table XIVa shows that both use a total of fifty in two-member clusters. Only eight combinations of the former group, /ts, dz, mz, nz, lz, rz, lž, rž/, cannot occur in the three-member final clusters containing bound inflectional morphemes, while also eight combinations of the latter group, /pθ, tθ, dθ, fθ, nθ, ŋθ, lθ, rθ/, never appear in the two-member final clusters without suffixes. In comparing the data in Tables XIIa and XIVa, one can easily see that eleven of the three-member final clusters with suffixes are also permissible as three-member clusters without suffixes.

The structure of four-member final clusters presents a rather complex picture, although there are only twelve such combinations in English. These clusters are formed according to two patterns: the bound morphemes /t, s, z/ added to three-member clusters without other suffixes, and the bound

TABLE XIVa

COMBINATIONS OF TWO-MEMBER FINAL CLUSTERS WITH SUFFIXES

two-member clusters \ with suffixes	Stops		Fricatives		
	vl	vd	vl		vd
	-t	-d	-s	-θ	-z
-pt			-pts		
-ps	-pst				
-pθ			-pθs		
-tθ			-tθs		
-kt			-kts		
-ks	-kst			-ksθ	
-dθ			-dθs		
-ft			-fts		
-fθ			-fθs		
-sp	-spt		-sps		
-st			-sts		
-sk	-skt		-sks		
-mp	-mpt		-mps		
-mf			-mfs		
-nt			-nts		
-nd					-ndz
-nč	-nčt				
-nǰ		-nǰd			
-ns	-nst				
-nθ			-nθs		
-ŋk	-ŋkt		-ŋks	-ŋkθ	
-ŋθ	-ŋθt		-ŋθs		
-lp	-lpt		-lps		
-lt			-lts		
-lk	-lkt		-lks		
-lb					-lbz
-ld					-ldz
-lf	-lft		-lfs	-lfθ	
-lθ			-lθs		
-ls	-lst				
-lv		-lvd			-lvz
-lč	-lčt				
-lǰ		-lǰd			
-lm		-lmd			-lmz
-ln					-lnz
-rp	-rpt		-rps		
-rt			-rts		
-rk	-rkt		-rks		
-rb		-rbd			-rbz
-rd					-rdz
-rg					-rgz

TABLE XIVb

KEY WORDS

		scripts /skrIpts/		
lapsed /læpst/				
		depths /dɛpθs/		
		eighths /etθs/		
		facts /fækts/		
waxed /wækst/			sixth /sIksθ/	
		widths /wIdθs/		
		lifts /lIfts/		
		fifths /fIfθs/		
lisped /lIspt/		lisps /lIsps/		
		fists /fIsts/		
risked /rIskt/		desks /dɛsks/		
limped /lImpt/		limps /lImps/		
		nymphs /nImfs/		
		prints /prInts/		
				sends /sɛndz/
lunched /lənčt/				
	changed /čenǰd/			
danced /dænst/				
		tenths /tɛnθs/		

TABLE XIVb (continued)

winked /wIŋkt/		sinks /sIŋks/	length /lɛŋkθ/*	
lengthed /lɛŋθt/**		lengths /lɛŋθs/		
helped /hɛlpt/		helps /hɛlps/		
		faults /fɔlts/		
milked /mIlkt/		milks /mIlks/		
				bulbs /bəlbz/
				colds /koldz/
engulfed /Ingəlft/		gulfs /gəlfs/	twelfth /twɛlfθ/	
		healths /hɛlθs/		
pulsed /pəlst/				
	solved /salvd/			solves /salvz/
belched /bɛlčt/				
	bulged /bəlǰd			
	filmed /fIlmd/			films /fIlmz/
				kilns /kIlnz/
chirped /čərpt/		chirps /čərps/		
		hurts /hərts/		
worked /wərkt/		works /wərks/		
	barbed /barbd/			verbs /vərbz/
				cards /kardz/
				bergs /bərgz/

*Dialectal form. **Rare (OED, VI, 198).

TABLE XIVb (continued)

surfed /sərft/		surfs /sərfs/		
cursed /kərst/				
berthed /bərθt/				
	curved /kərvd/			curves /kərvz/
parched /parčt/				
	charged /čarǰd/			
	warmed /wɔrmd/		warmth /wɔrmθ/	harms /harmz/
burnt /bərnt/	turned /tərnd/			barns /barnz
	curled /kərld/			girls /gərlz/

morphemes /s, t/ added to three-member clusters that contain the bound morpheme /θ/.[28]

With regard to the final nonsyllabics of English syllables, there are several peculiarities which are worth pointing out. First, unlike initial nonsyllabics that remain independent and unchanged all the time, the final nonsyllabics often tend to be increased by the addition of the bound morphemes indicating plural and possessive forms of nouns, third person singular present tense and regular past tense of verbs,

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[28] Bloomfield and O'Connor and Trim use the so-called two post-final system to analyze the combinations of final clusters. /t,d,s,z,θ/ are called "post-final"; /t, s/ as "2nd post-final" when they follow /θ/.

TABLE XVa

COMBINATION OF FOUR-MEMBER FINAL CLUSTERS WITH SUFFIXES

Three-member final clusters	Stops		Fricatives	
	vl	vd	vl	vd
	-t	-d	-s	-z
-kst			-ksts	
-mpt			-mpts	
-mps	-mpst			
-nts	-ntst			
-lts	-ltst			
-rst			-rsts	
-rld				-rldz
-ksθ			-ksθs	
-ndθ			-ndθs	
-ŋkθ	-ŋkθt		-ŋkθs	
-lfθ			-lfθs	

TABLE XVb

KEY WORDS

	texts /tɛksts/	
	tempts /tɛmpts/	
glimpsed /glImpst/		
chintzed /čIntst/		
waltzed /wɔltst/		
	bursts /bərsts/	
		worlds /wərldz/
	sixths /sIksθs/	
	thousandths /θaUzn̩dθs/	
lengthed /lɛŋkθt/	lengths /lɛŋkθs/	
	twelfths /twɛlfθs/	

and derived abstract nouns and ordinal numbers. Therefore, the relation between the finals without suffixes and those with suffixes is important.

Secondly, in a review of the final clusters with suffixes, it is easily found that the voiceless bound morphemes /-t, -s/ always combine with voiceless nonsyllabics; voiced bound morphemes /-d, -z/ always combine with voiced ones, and /θ/ combines with any phoneme. Such a rule may be applied to all the last positions of any kind of final clusters with the exception of /nt, lt/.[29]

Thirdly, because of assimilation (with the exception of /θ/), the suffixes are always voiceless when they occur as single finals, since in these cases they would have to be added to syllabics, which are always voiced. However, in the two-member or three-member clusters which combine with suffixes, the occurrence of /-t, -s/ is more frequent than those of /-d, -z/.

Fourth, there are no doubled nonsyllabics, such as */ss/ or */tt/. Whenever morphological combinations would produce such clusters, the two are reduced to a single nonsyllabic.

2.14 Prosodic Features

So far only the segmental phonemes of English syllables with their permissible combinations have been discussed.

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[29] Cf. Tables XIIIa, XIVa, XVa.

A syllable, however, in actual speech is always more than merely a succession of syllabic phonemes and nonsyllabic phonemes following one another in a certain order. Over and above such so-called "linear" distributions, there are some features which most of the time function to differentiate otherwise identical sequences. There are the prosodic features. Probably most linguists would agree that there are three such prosodic features closely relating to the syllables of human speech,[30] namely, the quantity (or duration) features, determined by the relative length of time through which a sound is continued; the stress (or loudness), the degree of force with which a syllable is produced; and the pitch (or tone) features, the musical pitch of the voice during its production. As mentioned earlier, all such features are carried primarily by means of the syllabic phonemes (or peaks) of the syllables. However, all do not function in the same way in all

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[30] Bloomfield pointed out that basic speech-sounds may be modified in various ways. Such modifications are: duration (or quantity), stress, and pitch (cf. Language, pp. 109-118). Bloch and Trager indicate: "Over and above these (e.g. a succession of vowels and consonants) there are particular variations in the length of individual sounds, in loudness, and in voice pitch--as much a part of the utterance as the segmental sounds, . . . These variations constitute the prosodic features of quantity (length), stress (loudness), and tone (pitch)" (cf. p. 34). Jakobson and Halle, following H. Sweet, use the terms "tone," "force" and "quantity" to indicate the three types of prosodic feature, corresponding to the three attributes of sensation-voice-pitch, voice-loudness, and subjective duration (cf. Fundamentals of Language, p. 22).

languages. The quantity features, for example, are utilized as segmental phonemes in German, whereas they are not distinctive at the same level in American English. For the features of pitch, most linguists would consider that, in Mandarin Chinese, they are basically functioning as segmental phonemes. But they are also used as the structural signals to constitute the contours of intonation, while in American English they are only playing the latter role of Mandarin Chinese. The features of stress are mostly regarded as the suprasegmental phonemes of most languages.

2.141 Stress

Since stress has been defined as the relative force of the energy expended in producing the utterance of syllables,[31] it is evident that the contrastive features of stress normally appear on polysyllabic words, phrases, clauses or sentences (which will be discussed in Chapter III), and have only limited application to isolated monosyllables. That is, the so-called system of four levels of stress which occurs in the conversational speech can not easily appear in monosyllables. However, the monosyllable is the smallest possible utterance of human speech, and consequently, it is also the smallest unit capable of assuming stress. In other words, stress, linguistically, is part of each syllable which a human being speaks, and every syllable possesses some degree of it, varying from very strong to very weak. In general, all monosyllabic words possess a strong or primary stress when spoken out of context. Certain monosyllabic words, however, take varying degrees of "sense stress,"[32] and have both strong and weak forms due to the principle of gradation of vowels according to stress. Such monosyllabic words are frequently used as conjunctions, prepositions, auxiliaries, pronouns, etc.; they have only one spelling-form, but in actual speech they appear in two or more forms in terms of whether or not they carry "sense-stress." For instance, in the sentence "He has money," has is the main verb and therefore has strong sense-stress. Hence it has its full vowel value as /hæz/. However, in a sentence like "John has gone," has is a mere auxiliary, the meaning of the main verb being contained in gone, which therefore has the sense-stress of the verb while has is without any. In actual speech, therefore, the second has is not /hæz/, but /həz/, /əz/, or /z/. Say: /hi həz gɔn/, /hi əz gɔn/, or /hiz gɔn/.[33]

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[31] There is a rather broad concept of stress which indicates that the feature of stress is more than the relative force or loudness; probably it combines all the features of pitch, length, sound quality, loudness and even gesture all together. Therefore, stress is a relative prominence of the syllabic phonemes in a sequence of syllables (cf. Arne Vanvik, On Stress in Present-Day English [Oslo: Bergen, 1961], pp. 32-34); also A. C. Gimson, An Introduction to the Pronunciation of English [London, 1962], p. 47). Since such a concept of stress is still uncertain, the author would rather follow the definition of loudness or degree of force in this study (cf. Jones, p. 245; Bloomfield, p. 110; and Hill, pp. 14-15).

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[32] Cf. Kenyon and Knott, p. xxiv.

[33] The example is taken from Kenyon, p. 150.

No doubt, it is a very important phenomenon that the changes of "sense stress" on monosyllabic words in actual speech result in the changes of the value of their syllabic phonemes. A closer examination of such changes of value of syllabic phonemes which may take place under varying degrees of stress reveals that all syllabic vowels and diphthongs appear in both weak and strong positions, and that the syllabic consonants, e.g., /m̩, n̩, ŋ̩, l̩, r̩/, occur under weak stress only. When the various vowels occur under weak stress as a result of their prosodic environment, they become reduced to /ə/ or /I/.

2.142 Quantity (Length)

Since English is a language which is spoken with a stress-timed rhythm, the quantity (length) of its syllables varies and is uneven in actual speech. Linguists generally believe that the factors which directly affect the changes of syllable quantity are not very simple; several factors must be involved. The quantity of the syllabic phoneme is an obvious one.

Diphthongs are intrinsically long, not because of the prolongation of either element, but because of the time required for the glide. Syllable structure itself is also important. Syllabic phonemes at the ends of monosyllabic words are usually longer than those followed by nonsyllabics; for instance, bee is longer than beet. It is also true that the vowel of a monosyllabic word is longer before a voiced nonsyllabic than before a voiceless; and longer before a continuant than before a stop, such as bead, beet and been. Length is also affected by the amount of stress which the syllable carried. The same syllabic becomes longer or shorter as its stress is increased or decreased.

2.143 Pitch

Professor Archibald A. Hill points out: "pitch patterns in English are best analyzed as belonging to the sentence as a whole, rather than to the word."[34] In general, the features of pitch play no part in the structure of isolated monosyllabic or even polysyllabic words in English, although in a few cases, it may affect the meaning of a monosyllabic utterance, such as the word yes with these different pitch patterns:

3 1   1 3   2 3   2 2
/yes↘/   /yes↗/   /yes↗/   and   /yes→/

These variations in pitch relate to the sentence rather than to the word.

2.2 The Basic Structure of Chinese Monosyllables

2.21 Syllabic Phonemes

There are three categories of speech sounds which can be syllabic phonemes in Mandarin Chinese: simple vowel, diphthong, and triphthong. Here, following the order of the treatment of English, the vowel sounds will be dealt with first.

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[34] Hill, Introduction, p. 27.

2.211 Syllabic Vowels

There are six simple syllabic vowels in Mandarin Chinese, namely, /a, ə, i, u, ü, ɚ/.[35] Since the features of tense-lax and of long-short are not distinctive in Mandarin, the vowels can be arranged in the following table in terms of the place at which the principal narrowing of the oral passage occurs (front, central, and back), the height of tongue, the degree of mouth opening and the presence or absence of lip rounding.

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[35] In a review of the literature, it is found that there are several different analyses of the syllabic vowels of Mandarin Chinese. In his study, Hartman concluded that there are three vowels: /a e i/, and three semivowels: /y w r/ (cf. *Language*, XX [1944], 28-42). Hockett agrees with Trager and George A. Kennedy that there is a biphonemic status of high-front rounded vowel /ü/, in addition to the three basic vowels (low, mid, and high) and the retroflex semivowel /r/ (cf. *JAOS*, LXVII [1947], 253-285; also cf. Hockett, *A Manual of Phonology* [Baltimore, 1955], p. 88). Since /ə/ varies depending on environment in Mandarin, the traditional analysis of Chinese linguists often has one [o] (ㄜ)* or two [o] (ㄛ)*, [ɛ] (ㄝ)* more vowels than those listed here as in the system /a o e ɛ i u ü r/ used in *National Phonetic Letters* (Ministry Education, Republic of China, 1919), and a system of /a o e i u ü r/ in *Modern Chinese Reader* (Peking, 1958). In this study, as suggested by the minimal pairs: /lu/ (4th tone) (deer), /lü/ (4th tone)(green), /la/ (4th tone)(candle), and /le/ (4th tone)(enjoy), the author contends that the vowel /u/ should be added to those described by Hartman and Hockett; and he regards [e], [ɛ], [o], and [ə] as allophonic variants of /ə/. /ɚ/ also is a simple vowel since it tends to be a syllabic sound in the syllable structures.

*Notation of Mandarin Chinese.

TABLE XVI

SYLLABIC VOWELS OF MANDARIN CHINESE

Jaw closed	Tongue (position) (height	Front		Central	Back	
		Lips			Lips	
		spread	rounded		spread	rounded
	High	i	ü			u
to						
	Mid			ə˞	ə	
Jaw open	Low			a		

The phonetic description of each syllabic vowel with its key word can also be given as in Table XVII.

2.212 Diphthongs and Triphthongs

The vowel nucleus of Mandarin Chinese presents a complex picture. There are five phonemes /i/, /u/, /ü/, /a/, /ə/ which are involved in the formation of diphthongs and triphthongs. The mid and low vowels /ə, a/, tending to be the syllabic center, occur either before or after the high vowels, as in Table XVIII below. /ü/ occurs only before /ə/; /u/ and /i/ can occur either before or after /a/ or /ə/. Complex syllabics containing /ə˞/ are not treated here, but will be described later under the phonotactics of the syllabic phonemes.

TABLE XVII

PHONETIC DESCRIPTION OF VOWEL PHONEMES OF MANDARIN CHINESE

Phonemic Symbol	Key Word	English Near Equivalent
Front Vowels:		
/i/	mǐ (rice)	meet, see
/ü/	lǘ (ass)	---
Back Vowel:		
/u/	lù (road)	moon
Central Vowels:		
/a/	mā (mother)	balm, father
/ə/	gě (brother)[36]	cut, some
/ɚ/	èr (two)	sir

TABLE XVIII

DIPHTHONGS OF MANDARIN CHINESE

	-a	-ə	-i	-u	-ü
a			ai	au	
ə			əi	əu	
i	ia	iə			
u	ua	uə			
ü		üə			

---

[36] Different symbols are chosen for the phonetic and orthographic representations of this phoneme because most of the time it is phonetically somewhat like the English sound that is transcribed /ə/ though it is traditionally written e.

The triphthongs are composed of /i/ or /u/ preceding certain of the diphthongs whose initial segment is /a/ or /ə/, as shown in Table XIX.[37]

TABLE XIX

TRIPHTHONGS OF MANDARIN CHINESE

	-ai	-əi	-au	-əu
i	iai		iau	iəu
u	uai	uəi		

The phoneme /a/ in syllable-final position is phonetically lower and farther retracted than the English [a], but when followed by /i/ or /n/ it is raised and fronted and when followed by /u/ or /ŋ/ it is retracted, as in the following rule:[38]

[a] in /iai/, /uai/, /an/, /uan/, /ai/, /ian/, /üan/
/a/ —> [ɑ] in /a/, /ia/, /ua/
[ɒ] in /ɑu/, /iɑu/, /ɑŋ/, /iɑŋ/, /uɑŋ/

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[37] /iəu/ and /uəi/ may be classified as diphthongs /iu/ and /ui/, since there is no clear segment for /ə/. Kung-pu Li, for example, classifies them as diphthongs (cf. his "Machine Recognition of Mandarin Monosyllable," *Project on Linguistic Analysis Report*, No. 9 [Ohio State University, 1964], p. 44). However, traditional analysis and most linguists regard them as triphthongs (cf. *National Phonetic Letters*; Chao, p. 22; and Hockett, p. 259).

[38] The phonetic symbols used here are intended to represent only approximations based on the English vowel sounds that are usually transcribed by means of these symbols. For purposes of instruction the only way of assuring accuracy would be to use native speakers as models.

The phoneme /ə/ also is affected by phonetic environment. In syllable-final position or when followed by /ŋ/ it is phonetically similar to English [ə], but it is fronted and raised slightly when followed by /i/ or /n/, as follows:

/ə/ —> [ɛ] in /əi/, /uəi/, /iə/, /üə/
[ə] in /ə/, /uə/, /ən/, /uən/, /üən/, /əŋ/, /uəŋ/, /əu/

Before /i/ the /ɛ/ is a little high and forward; before /ŋ/ the [ə] is retracted and slightly rounded. In both the diphthongs and the triphthongs the /i/ and /u/ undergo something like tensing in initial position (becoming [j] and [w]) and undergo something like laxing in final position (becoming [I] and [U]).

2.22 Nonsyllabic Phonemes

According to the traditional analysis of monosyllabic structures, in Chinese there are twenty-one nonsyllabic phonemes; they occur only in syllable-initial position.[39] One additional nonsyllabic, /ŋ/, occurs only in syllable-final positions. Only /n/ can occur either initially or finally. The descriptions of these nonsyllabics can be tabulated as in Table XX.

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[39] Most modern treatments of the phonology of Mandarin Chinese use the analysis adopted in 1919 by the Chinese Ministry of Education and published in the pamphlet *National Phonetic Letter* (e.g., Chao's *Mandarin Primer*, Tōdō's *The Phonemes of the Peiping Dialect*, *Modern Chinese Reader*, and W. S-Y. Wang and Kung-pu Li's *Machine Recognition of Mandarin Monosyllables*). The description of consonants in the present study closely follows these analyses. However, there is also a different treatment held by some Western linguists because of the peculiarity of the palatal series /x j q/. This palatal

2.23 Phonotactics

2.231 The Pattern of Syllable Structure

Like the structure of English syllables, there are also four fundamental patterns of Chinese syllables. However, nonsyllabic phonemes in Mandarin, unlike English, never occur in clusters either in initial position or in final position. On the contrary, syllabic phonemes in Mandarin present a complex clustering picture since there are more

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series was first given serious treatment by Henri Frei in his "Monosyllabisme et polysyllabisme dans les emprunts linguistiques ... avec un inventaire des phonèmes de Pekin et de Tokio, Etudes de linguistique japonaise, Bulletin de la Maison Franco-Japonaise, VIII (1936), 123-124. He considered them as separate phonemes, as the traditional analysis does. However, in Mandarin Chinese, in addition to the palatal series, there are two others that are phonetically similar to them. The apico-alveolars /s z c/ and the apico-palatals /sh zh ch/. The consonants of the palatal series occur only before the vowels /i/ and /u/; the other two series very seldom occur in this position. Hartman made an intensive investigation of these nine consonants in 1944, and concluded that the apico-palatals /sh zh ch/ are not to be considered "as unit phonemes but as clusters having /r/ as the second elements," and "the palatal /x j q/ and the apico-alveolars /s z c/ remain as allophones of the same phonemes, the palatal series being conditioned by the following /i/ or /u/" (Lawton M. Hartman III, "The Segmental Phonemes of the Peiping Dialect," Language, XX [1944], 28-42). In this study, for teaching purposes, the author will follow the traditional analysis regarding them as nine separate phonemes. The retroflexes /sh, zh, ch/ are treated here as single phonemes.

TABLE XX

NONSYLLABIC PHONEMES OF MANDARIN CHINESE

		bilabial	labio-dental	apico-alveolar	apico-alveolar (sibilants)	apico-palatal (retroflexes)	palatal	dorso-velar
Stops	unaspirated	b		d				g
	aspirated	p		t				k
Affricates	unaspirated		f		z	zh	j	
	aspirated				c	ch	q	
Fricatives	voiceless				s	sh	x	h
	voiced					r		
Resonants	nasal	m		n				ŋ
	lateral			l				

diphthongs and triphthongs than in English, all of which can either stand by themselves or combine nonsyllabics to form monosyllabic words. Therefore, the four fundamental patterns of syllabic structure which were described previously can be simplified into one equation as follows:

$$\text{Monosyllable Structure} \longrightarrow \overparen{N_0^1\,S}\,\overparen{\,N_0^1}$$

2.232 The Structure of Nonsyllabic Phonemes

As shown in the above equation, the phonotactics of nonsyllabic phonemes in the Mandarin syllable in both initial and final position are rather simple. There are only two possibilities for each position, either without any nonsyllabic or with a single nonsyllabic. Zero initial is possible before any simple or complex syllabic phoneme.[40] All the nonsyllabic phonemes except /ŋ/ can occur as a single initial.[41] Syllable-final position without nonsyllabic phonemes are very common in Mandarin, because of the twenty-two nonsyllabics, only /n/ and /ŋ/ can occur as syllable finals.

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[40] Each syllabic phoneme may stand by itself as a monosyllabic word without any initial or final nonsyllabic. For example: /i/ (first tone) means *one*, /u/ (first tone) means *room*, /ü/ (second tone) means *fish*, /a/ (first tone) is used as an exclamation or interjection, /e/ (second tone) means *moth*, /er/ (fourth tone) means *two*. For the diphthongs, /ia/ (first tone), *duck*; /ua/ (first tone), *frog*; /ie/ (first tone), *choke*; /ue/ (traditionally transcribed as *uo* (first tone), *nest*; /üe/ (first tone), *promise* or *treaty*; /ai/ (first tone), *sorrow*; /ei/ (fourth tone), an exclamation or *to promise*; /au/ (first tone), *boil*; and /eu/ (first tone), *gull*. For the triphthongs, /iai/ (first tone), *cliff*; /uai/ (first tone), *awry*; /uei/ (first tone), *dignity*; /iau/ (first tone), *waist*; /ieu/ (first tone), *grief*; and so on.

[41] Helen Wong indicates that Chao points out that a very small minority of Mandarin speakers has /ŋ/ in syllable-initial

2.233 The Phonotactics of Syllabic Phonemes

As stated above, the syllabic can be any one of the six single syllabic phonemes /i u ü a ə ɚ/ or any diphthong or triphthong. In addition to the vocalic clusterings listed in Tables XVIII and XIX, there are retroflex syllabics that should be treated phonetically as a single complex syllabic rather than as a syllabic followed by /ɚ/, or perhaps /r/.[42] Thus, the structure of the complex syllabics can be treated under two categories:

2.2331 Syllabic clusters without /ɚ/

These kinds of clusters are always formed by two or three of the five syllabic phonemes excluding /ɚ/. Simply speaking, they are the diphthongs and triphthongs which were discussed above.

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position. Thus, instead of /ea/ (fourth tone) hungry we find /ŋea/ (cf. Wong, p. 271, footnotes).

[42] Many books use the symbol r as a final nonsyllabic in transcribing these retroflexed syllabics. However, since the nonsyllabic /r/ is clearly a fricative, and since these retroflexed syllabics have no phonetic similarity to fricatives, the symbol ɚ is used here to transcribe both the single simple syllabic and the retroflex feature in the data described below.

2.2332 Syllabic cluster with /ɚ/[43]

Syllabic clusters formed by adding retroflex /ɚ/ present a complex picture; the following generalizations may indicate its features:

a. Retroflexed monophthongs

When retroflexed suffix /ɚ/ is added directly after syllabic /-i/, /-a/, /-ə/, and /-u/, it forms a kind of two-syllabic cluster:

[fa]	[faɚ]	(3rd tone)	(means, way)
[gə]	[gəɚ]	(1st tone)	(song)
[tu]	[tuɚ]	(4th tone)	(rabbit)
[ji]	[jiɚ]	(1st tone)	(chicken)

b. Retroflexed diphthongs

When the retroflexed suffix /ɚ/ is added after the diphthongs /-ai/, /-əi/, they drop their final vowel, forming a two-syllabic cluster, as in:

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[43] The retroflexed syllabic /ɚ/ poses a knotty problem in Mandarin Chinese. It is a free morpheme in a very small number of monosyllabic words, such as /ɚ/, with the second tone, meaning *child* and *moreover*; with the third tone, it means *ear*, *you*, *near*, or *cookie*; fourth tone, *two*. It can also be the diminutive suffix (cf. Chao, p. 30), used with a great number of monosyllabic words, giving the "r-coloring" to the preceding syllabics. Chao indicates that such monosyllabic words are morphologically complex in that each is derived from a primary word plus a diminutive suffix--derived, in most cases, from the word *child* (p. 30). However, the meaning of such a diminutive suffix is more varied than just the original sense of "child" or smallness. It might be from a grammatical point of view, for instance, a nominalizing particle, as in /huaɚ/ (second tone), meaning a sort of slipperiness; or in /məɚ/ (fourth tone) a kind of annoyance.

[gai] [gaɚ] (4th tone) (cover)
[wəi] [wəɚ] (4th tone) (smell)

Simplification does not occur, however, when /ɚ/ is added to the other diphthongs and triphthongs.

c. When /ɚ/ is added to a word with a final /n/, the final nasal is dropped, as in the following:

[fən] [fəɚ] (1st tone) (part, unit)
[bian] [biaɚ] (1st tone) (side, edge)
[xin] [xiɚ] (4th tone) (message)

However, a word with a nasal final /-ŋ/, a suffix /ɚ/ is directly added after /-ŋ/, as in

[deŋ] [deŋɚ] (4th tone) (stool)

2.24 Prosodic Features

2.241 Tone[44]

Mandarin Chinese is a tone language. As mentioned earlier, it has not only a "phrase-pitch system"

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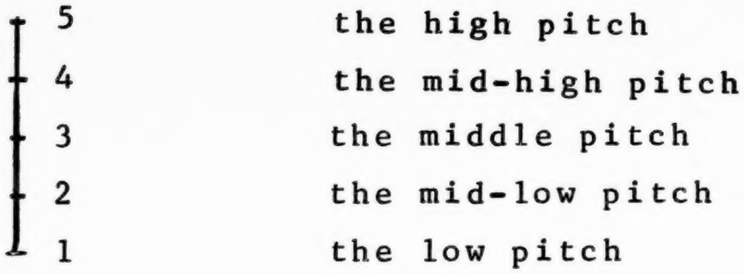
[44] The nature of Mandarin tone has been a subject of much controversy. Since the feature of tone is a constituent pitch which overlies characteristic syllables as a whole, several linguists regard it as a segmental phoneme. However, many linguists pay more attention to its prosodic aspect. Hartman first pointed out four prosodemes of tone in Mandarin (cf. Hartman, p. 29). Hockett discusses the contrastive contours of pitch, volume and length, and their relation to both stress and tone (cf. Hockett, _Peiping_ . . ., p. 46). However, he also indicates that [tone] is absolutely as essential a part of the word as its consonant and its vowels (cf. Hockett, _Progressive Exercises in Chinese Pronunciation_ [New Haven,

(intonation), but also a "word-pitch system" (tone).[45] The most important feature in a Mandarin word (character) is its constituent tones; each syllable contains a characteristic pitch pattern which is an integral part of that syllable, as is any of the other found features which serve to identify it. Most linguists generally agree that there are four tones for stressed syllables and one, the so-called "neutral tone," for the unstressed syllables in Mandarin speech.[46] Each tone has its own pitch level. If we draw a short vertical line to present the range of the variation of pitch and divide it into four equal intervals with five points, these five points, counted from the bottom to the top, represent the five degrees as the following chart shows.

1951], p. xv). Hill indicates: "The traditional tones are morphemes rather than phonemes, and every syllable has a segmental morpheme plus a pitch morpheme" (private conversation). The author, for the sake of convenience in this comparative study, includes it in the discussion of prosodic features.

[45] The terminology is adopted from K. L. Pike's Tone Language (Ann Arbor, 1948), pp. 14-15.

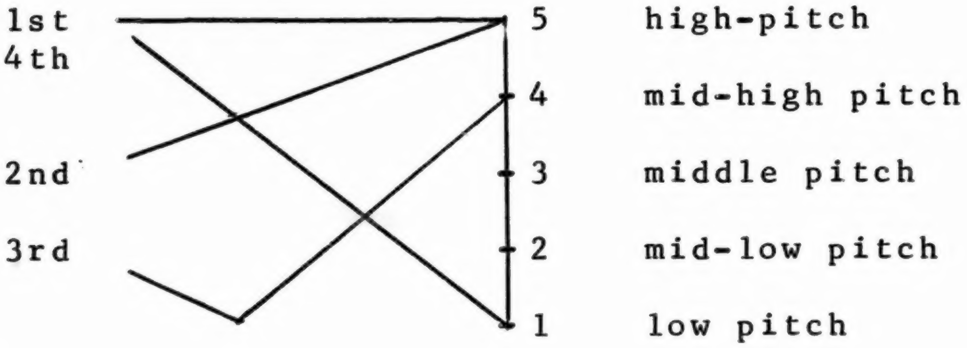
[46] There is also a different theory regarding the number of tones, that there are five tones for the stressed syllables instead of four tones. This theory treats the so-called "raised-third" tone as a separate phonemic unit. However, such a raised-third tone is usually not considered phonemically distinct from the second tone (cf. Hockett, Peiping . . . , p. 256).


5 the high pitch
4 the mid-high pitch
3 the middle pitch
2 the mid-low pitch
1 the low pitch

The pitch levels of the four tones for stressed syllables can be shown on such five-degree charts as in Table XXI.

TABLE XXI

THE PITCH LEVELS OF FOUR TONES


1st
4th
2nd
3rd
5 high-pitch
4 mid-high pitch
3 middle pitch
2 mid-low pitch
1 low pitch

Their descriptions, phonemic transcriptions, and pitch levels are given in Table XXII.[47]

It is easy to learn from the above table that the first tone is opposed to third tone; both have contrasting pitch as their distinguishing features: /1/ is high, /3/ low. Second

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[47] This table is based on the analyses used in Chao (p. 25) and Modern Chinese Reader (p. 30). However, in Kung-pu Li's analysis, he points out that the pitch level of third tone is "315." (Cf. Machine Recognition of Mandarin Monosyllable [Columbus, Ohio, 1964], p. 39).

TABLE XXII

THE DESCRIPTIONS, PHONEMIC TRANSCRIPTIONS AND PITCH LEVELS OF FOUR TONES

Tone	Description	Transcription	Pitch Level	Graph
1st tone	High and level	— or 1	55	˥
2nd tone	High and rising	/ or 2	35	˧˥
3rd tone	Low and dipping	✓ or 3	214	˨˩˦
4th tone	High and falling	\ or 4	51	˥˩

tone and fourth tone are in contrast, the former is rising, the latter, falling.

As mentioned above, there is a neutral tone for unstressed syllables in Mandarin Chinese, which occurs often in spoken language. Its phonemic transcription is usually marked by "•" above the vowel of the syllable, or by the absence of any symbolization. Such a neutral tone varies much in pitch, because its pitch level is mainly dependent upon the tone of the syllable preceding it, but it is never as high as the pitch level of first tone. It usually occurs with certain grammatical categories such as suffixes, pronouns in object positions, particles, and reduplicative constructions.[48] Since the occurrence of neutral tone is closely related to polysyllabic words, a thorough discussion of this aspect will be given in the next chapter.

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[48] Cf. Chao, p. 27.

2.242 Stress

There is no doubt that some degree of stress exists in every Mandarin utterance. Since stress is defined as relative force or contrastive levels of stress contour, as in English, it cannot occur within monosyllables. However, any monosyllable spoken in isolation usually has a moderate stress. In some cases, it does have, like English, the so-called "sense-stress" also. For instance, /ta/ (first tone) with a loud stress means: "It is he." If saying the same syllable /ta/ with an extra-loud stress, the meaning would be changed to "Is it he?" ("it is hard to believe that it is he"). Since the feature of tone overlies each monosyllable, and is closely allied with stress, changing the degrees of stress of each monosyllable directly affects the tonal contour. Generally speaking, a monosyllable with a first tone is higher and longer when loudly stressed than when less strongly stressed. A second-tone syllable is longer and has a sharper rise when stressed. A third-tone syllable is, at least, considerably longer; it may also be lower in pitch. A four-tone syllable starts higher, falls further, and lasts a bit longer.[49]

2.243 Quantity (Length)

The quantity (length) of a syllable, as in English, is not phonemic in Mandarin. In Mandarin the length of a syllabic is conditioned by stress and tone, whereas the length of a syllabic in English is conditioned by stress and the quality of the final element in the syllable.

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[49] Hockett, pp. 52-53.

2.3 The Contrastive Analysis of Both Sound Systems

2.31 A Comparison of the Syllabics

As shown in Sections 2.11 and 2.21 there are 11 simple vowels and three diphthongs used as the syllabics in English, whereas there are six simple vowels, nine diphthongs and four triphthongs in Mandarin. Since both vowel systems involve three dimensions of contrast (i.e., three positions of tongue advancement, three levels of tongue-height, and lip-rounding), the phonetic specification of both vowel systems can be tabulated according to these dimensions as in Table XXIII.

2.311 Quadrilateral Movement versus Triangle Movement

In the production of syllabic sounds, the most important single factor is the combined movement of the top of the tongue in the oral cavity and the configuration of the lips. Such a movement varies due to the phonological pattern of each language. For producing English syllabics, the top of the tongue has a quadrilateral movement in the oral cavity,[50]

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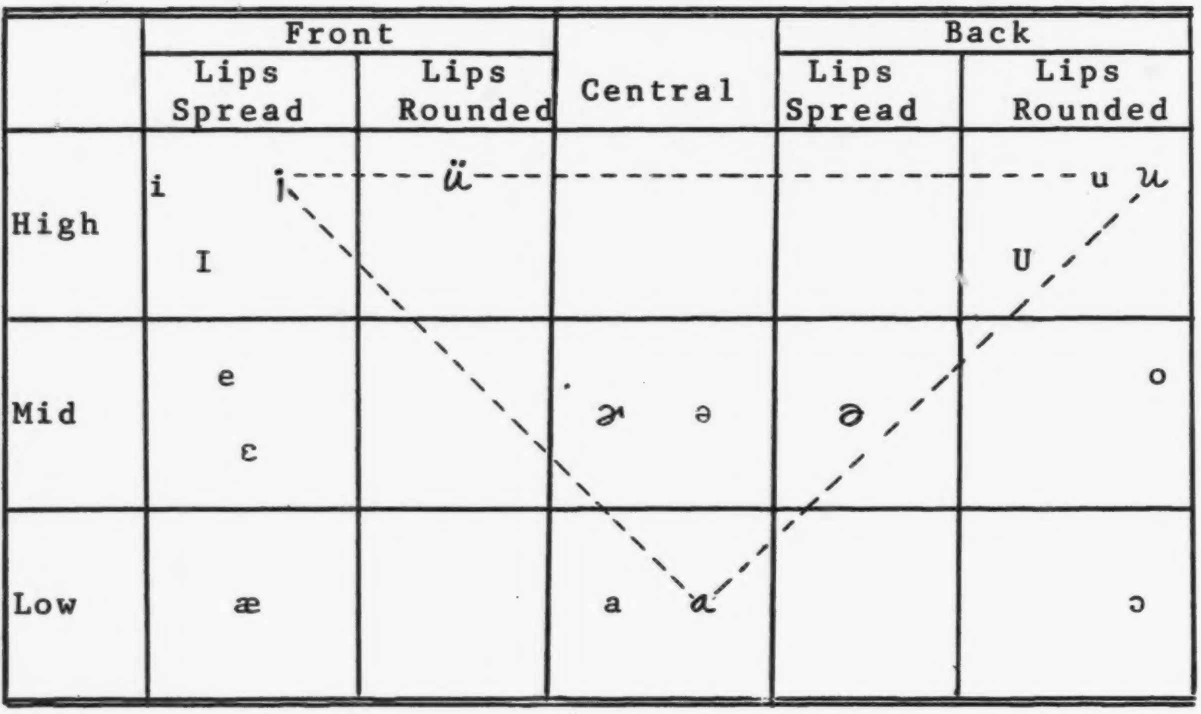
[50] A highly symmetrical pattern is posited by a number of linguists for English syllabics. Such a symmetrical pattern forms what the author prefers to call a quadrilateral pattern.

TABLE XXIII

COMPARISON OF THE SYLLABICS OF BOTH SYSTEMS



	Front		Central	Back	
	Lips Spread	Lips Rounded		Lips Spread	Lips Rounded
High	i i I	ü			u u U
Mid	e ɛ		ɚ ə	ə	o
Low	æ		a ɑ		ɔ

whereas it has a triangular movement in Mandarin Chinese. In English, as shown in Table XXIII, there is a system of eleven vowels produced in three positions (front, central, and back, contrasting on all three levels (high, mid, and low); thus the top of the tongue moves toward the different positions in a quadrilateral pattern. However, a system of six vowels in Mandarin, which phonemically lacks front-mid, front-low, back-low vowels, carries the top of the tongue with the lip-rounding in the three directions of a triangle.

2.312 Tense-Lax Contrast versus Non-contrast

The contrast between tense and lax articulation is also a significant feature of the English syllabic. As learned earlier, in English there is a series of vowel sounds in which the muscles of the tongue are tense, opposed to another series in which they are held lax.[51] These are the front-unrounded series /i/ vs. /I/, /e/ vs. /ɛ/, and the parallel series of the back-rounded /u/ vs. /U/, /o/ vs. /ɔ/. In Mandarin there is no such contrast that is phonemic. The front-unrounded /i/ and back-rounded /u/ stand for both the tense and lax allophones.

2.313 The Features of Vowel Nuclei

Mandarin Chinese has more vowel nuclei (nine diphthongs and five triphthongs according to most schools) than English does. Since the final position of Mandarin syllables is limited to the nonsyllabics /n/ and /ŋ/, quite often the syllable ends with the syllabic. Like English, the vowel nuclei occurring in Mandarin tend to glide. However, such gliding mainly depends upon the pitch level (tone) which it carries, and is often shorter than its corresponding English syllabic since there is no clear boundary between the constituent phonemes of these vowel nuclei.[52] The diphthongs and monophthongs combining with the nasal ending /n/ or /ŋ/ also tend to be a unit much like the strictly vocalic nuclei; for instance, in /an/, /ən/, /ang/, /əng/, /uən/, and so on, the nasal is rather difficult to separate from the vowel. That is the reason why most linguists prefer the so-called "Initial-Final Division" in analyzing of structure of Mandarin monosyllables.

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[51] The difference between a tense syllabic and a lax one can be felt by putting the thumb and index finger around the bottom of the tongue muscles underneath the jaw, and feeling the difference in tension when pronouncing such a word as bit as opposed to a word beat.

[52] Such vowel nuclei are called "dynamic vowels" by some scholars (cf. Kung-pu Li, p. 42). In the writing system of Chinese, they are absolutely individual characters, such as /au/--熬 , /əu/--歐 , /uəi/--威 , /iau/--妖 .

2.314 Articulation Difference and Allophones

2.3141 High front syllabics

Looking at Table XXIII, one finds that there are contrasting high-front syllabics in both English and Mandarin. The former is a tense-lax contrast /i/ versus /I/; the latter, spread-round contrast /i/ versus /ü/. Such contrasts of both languages are phonetically entirely different. Phonetically the closest high-front vowels would be /i/, but there is significant difference since in the English /i/ the tongue is glided upwards, whereas in Chinese it is steady in high-front position, without any glide at all. In addition, there is no such lax /I/ in Mandarin; instead, there is an apico-alveolar [ɿ] and an apico-palatal [ʅ] as allophones of /i/. The occurrences of these three sounds are in complementary distribution. [ɿ] occurs only after dental sibilants /z, c, s/; [ʅ] only after retroflex nonsyllabics /zh, ch, sh, r/; [i] can occur after the palatal series /j, q, x/ in addition to nonsyllabics /b, p, m, d, t, n, l/. Thus all are allophones of front-high-spread syllabics. There is also another significantly different phoneme, the high-front-round /ü/ in Mandarin which does not occur in English.[53] It is made with the tongue in the [i] position and the lips strongly rounded.[54]

2.3142 High back syllabics

Both systems have a high back lips rounded syllabic /u/. However, Chinese /u/ has the tongue retracted more and the lips more strongly rounded than in English /u/. Since it is steadily articulated, the tongue and lips keep in the position described from beginning to end, while in English it has a gliding articulation with the tongue moving upward and slightly back as the lip rounding progressively increases. Unlike English, there is no phonemic lax /U/ in Mandarin, but there is a very rare allophone of Chinese /u/ that is similar to the English /U/; it occurs in triphthongs following /ia/, /iə/.

2.3143 Mid back syllabic

Both English and Mandarin have a back-mid vowel sound, but each has a number of peculiarities. The English back-mid syllabic /o/ has very definite lip rounding, whereas the Mandarin /ə/ has many variations of articulation depending on environmental conditioning, with the lips rounded.[55]

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[53] /ü/ does occur in German, French and Hungarian, e.g., über in German, usine in French.

[54] There is a transcription of /iu/ for /ü/, since Mandarin /ü/ has more of an /i/ quality than an /u/ quality; it is described as a simultaneous pronunciation of [i] and [u] (cf. Chao, p. 24).

2.3144 Mid central and low central syllables

Both systems have a mid-central syllabic, but in Mandarin it is produced with the tongue a little farther forward than in English and is retroflexed.

There is much similarity between the low central syllabic of both systems. Mandarin [a] is much like the English [a] in "father," but is a little farther back. In addition, it has more variants than the English /a/ has.[56]

2.32 A Comparison of Nonsyllabics

There are twenty-four nonsyllabics in English, whereas there are twenty-two in Mandarin. A comparison of two systems can be tabulated as in Table XXIV. A contrastive analysis of two nonsyllabics of both systems shows that there are some significant differences between them, as follows:

2.321 Voice versus Voicelessness

Since the voice-voicelessness distinction appears as one major feature in English nonsyllabics, it is better

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[55] See p. 84 above.

[56] See p. 83 above.

TABLE XXIV

Comparison of the Nonsyllabics of Both Systems

		Bilabial	Labio-dental	Inter-dental	Alveolar (sibilants)*	Palatal		Velar	Glottal
						(retro-flexes)			
Stops	Vl unaspirated aspirated	p b p			d t t			k g k	
	Vd	b			d			g	
Frica-tives	Vl		f f	θ	s* s	š sh	x	h	h
	Vd		v	ð	z	ž r			
Afri-cates	Vl unaspirated aspirated				Z* C*	č zh ch	j q		
	Vd					ǰ			
Nasal		m m			n n			ŋ ŋ	
Lateral					l l				
Glide					r	y		w	

Note: Typewritten for American English Nonsyllabics; handwritten for Mandarin Chinese.

to treat this feature first in analyzing the two systems. Looking at Table XXIV, one finds that there is only one pair, /sh, r/, in Mandarin Chinese that is distinguished solely by voicing or voicelessness. Although there are four nonsyllables which are normally voiced, other than the pair /sh,r/, they have no voiceless counterparts. They are the nonsyllabics /m, n, n, l/. Therefore, the voice-voicelessness distinction is not a prominent feature in Mandarin.

2.322 Aspiration versus Nonaspiration

The most important distinctive feature in Mandarin is the aspiration-nonaspiration contrast. There are six pairs of nonsyllabics which share this feature. These sounds are the stops /b, p/, /d, t/, /g, k/ and the affricates /z, c/, /zh, ch/, and /j, q/. The second phoneme of each pair is always accompanied by a puff of air, which imparts a "breathy" quality to the sound. This quality is known as aspiration. It resembles the /p/ in strongly stressed *put* in English. The first phoneme of each pair is not released with a puff of air; in this respect it resembles the unaspirated [p] in the English word *spin*. In English the voiceless nonsyllabics /p, t, k/ are aspirated when they immediately precede stressed vowels, unless there is a preceding /s/; there is no aspiration when it occurs before another nonsyllabic or a juncture, when it is in an *s*-cluster, or when it is an unreleased final, as in *apt* /æpt/, *act* /ækt/, *hats* /hæts/, *stick* /stIk/, *look out* /lʊk awt ↓/. Obviously, such occurrences are impossible in Mandarin Chinese, because nonsyllabics cannot occur in clusters or in final position in the language. Aspiration, then, is phonemic in Mandarin, whereas in English it is an allophonic variation that is caused by environment.

2.323 Allophones and Non-functional Variations

2.3231 Stops

In English, each of the voiceless stops has several allophones, such as /t/: aspirated [t'] as in *tin*, unaspirated [t] as in *still*, unreleased [t¯] as in *seat*, and tap [t̂] as in *butter*. As seen here, the phoneme /t/ in English can occur in syllable-initial position, or in syllable-final position, or in intervocalic position, and after other nonsyllabics. The voiced stops also have a few non-functional variations in English; for example, /b/ has both strong and weak explosions, as well as voiceless explosions. As mentioned above, since the distributions of these six stops of Mandarin nonsyllabics are fixed in syllable-initial position, such non-functional variations as those occurring in English stops rarely occur in Mandarin stops.

2.3232 Fricatives and affricates

Little discussion is necessary for the fricatives and affricates because the English nonsyllabics /v, θ, ð, z, ž/ do not exist in Mandarin and the Mandarin fricative

/x/ and affricates /z, c, zh, j, q/ do not exist in English. The fricatives /f/ and /s/ are very similar in the two languages. The major difference in the nonsyllabics is retroflexion in the fricatives and affricates, which will be discussed later

2.3233 Nasals and the lateral

There is practically no difference between the English and Mandarin nasals. However, the English lateral /l/ presents more complexity than the Mandarin /l/. In English /l/ possesses two clearly distinguishable allophones, commonly referred to as light and dark "l," symbolized [l] and [ɫ],[57] while there is only one allophone, which is light, in Mandarin.

2.3234 Other differences

There are a few other differences that should be mentioned. The apico-alveolars /d, t, n, l/ in Mandarin have a tongue position farther forward than those of English, but the difference in shade is negligible. Another obvious peculiarity of the Mandarin nonsyllabic system, as shown in Table XXIV, is that there are a series of sibilant sounds /z, c, s/, a series of retroflex sounds /zh, ch, sh, r/ and a series of palatal sounds. The sibilants are pronounced with a sort of buzzing sound like a prolonged [z] in buzz. The four retroflex sounds are made by curling the tip of the tongue to a post-cacuminal position farther back than the [r] of English crew; there is no lip action, either protrusion or rounding, unless the vowel following happens to be a rounded vowel. The palatal group is produced by flattening the tongue surface and placing it against the palate. Therefore, they are different from the /š, č, ǰ/ of English, which are produced with a groove down the center of the tongue. The Mandarin /r/ has the same point of articulation as the retroflexes, unlike the English /r/; it is also shorter and is accompanied by friction. The Mandarin /h/ is not the English glottal semivowel /h/, but rather a dorso-velar fricative [x].

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[57] Bronstein, pp. 124-125.

2.33 A Comparison of Monosyllabic Structure

In the earlier discussion, the author formulated a rule for English monosyllable structures: $N_0^3 \frown S \frown N_0^4$, another rule for Mandarin as $N_0^1 \frown S \frown N_0^1$.... According to both rules, the twenty possible English syllable patterns and the ten possible Mandarin patterns can be given in the following two tables:[58]

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[58] English diphthongs are treated as a single syllabic unit here since only three are commonly recognized as phonemic by most schools: /aI, au, ɔI/. In Mandarin, since the significant clustering occurs in the syllabic portion of the syllable, the symbol V is used in Table XXVI to show the most significant patterning. Syllable pattern 8 in English and syllable pattern 10 in Mandarin do not occur, but they are included here because according to the formulas given above they are possible.

TABLE XXV

THE PATTERNS OF MONOSYLLABLE STRUCTURE IN ENGLISH

	Permissible Combinations								Key Words	
1.				S					a	/e/
2.			N	S					we	/wi/
3.		N	N	S					play	/ple/
4.	N	N	N	S					straw	/strɔ/
5.				S	N				it	/It/
6.				S	N	N			apt	/æpt/
7.				S	N	N	N		arts	/arts/
8.				S	N	N	N	N		
9.			N	S	N				hat	/hæt/
10.			N	S	N	N			belt	/bɛlt/
11.			N	S	N	N	N		text	/tɛkst/
12.			N	S	N	N	N	N	texts	/tɛksts/
13.		N	N	S	N				flag	/flæg/
14.		N	N	S	N	N			breast	/brɛst/
15.		N	N	S	N	N	N		stamps	/stæmps/
16.		N	N	S	N	N	N	N	twelfths	/twɛlfθs/
17.	N	N	N	S	N				street	/strit/
18.	N	N	N	S	N	N			streets	/strits/
19.	N	N	N	S	N	N	N		strength	/strɛŋkθ/
20.	N	N	N	S	N	N	N	N	strengths	/strɛŋkθs/

TABLE XXVI

THE PATTERNS OF MONOSYLLABLE STRUCTURE OF MANDARIN

	Permissible Combinations					Key Words	
1.		V				/ǔ/	"five"
2.		V	V			/aì/	"love"
3.		V	V	V		/iāu/	"waist"
4.	N	V				/kè/	"lesson" or "class"
5.	N	V	V			/shéi/	"who"
6.	N	V	V	V		/jiāu/	"to teach"
7.		V	V	N		/iún/	"cloud"
8.	N	V	N			/rén/	"man"
9.	N	V	V	N		/niān/	"year"
10.	N	V	V	V	N		

2.331 Cluster of Nonsyllabic versus Non-Cluster of Nonsyllabic

There are twenty different permissible combinations of monosyllable structure in English, whereas there are only ten in Mandarin. From the patterns listed above, it is easily seen that there are contrastive features of clustering, in both the nonsyllabics and the syllabics of both languages. English undoubtedly has the higher occurrence of nonsyllabic clusters in both initial and final position of syllables. The number of nonsyllabic clusters can consist of a maximum of three in initial, four in final. At the other extreme, the nonsyllabic structure of Mandarin Chinese is rather simple. It has no cluster at all, neither in initial nor in final position. Moreover, the limitation on the occurrence of single nonsyllabics in syllable-initial or syllable-final position, in Mandarin, especially the latter, is tightly restricted. Although all nonsyllabic phonemes of both languages except /ŋ/ can occur initially, the frequency of occurrence of Mandarin nonsyllabics is much less than that of English. As for final, there are only two nonsyllabics /n, ŋ/, and a syllabic suffix /ɚ/ occurring in monosyllable-final position in Mandarin,[59] whereas all English nonsyllabics except /h/ can be used as a syllable-final.

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[59] There are several nonsyllabics other than /n, ŋ/ and /ɚ/ occurring in final position in fast conversational speech when certain morphophonemic changes take place, such as

2.332 Syllabics in Both Languages

In comparing the syllabic structures of both languages, it is easily seen that Mandarin has more permissible combinations of syllabic clusters than English does. Since the limitation on the occurrence of single final nonsyllabics in Mandarin monosyllables is restricted to the two nasals /n, ŋ/, all finals of Mandarin monosyllables are resonant sounds with no audible frication. On the other hand, English monosyllables can end with any resonant sound except /w/ or /y/ and any obstruct except /h/.

2.34 A Comparison of Prosodic Features

Since the nature of prosodic features fundamentally concerns contrast between syllables, not much can be said concerning this feature in monosyllables. In any language a monosyllable spoken in isolation receives primary stress. The length of English syllables as well as Mandarin syllables is generally regarded as nonfunctional. The single distinguishing prosodic feature between the two systems is pitch level on each individual syllable. In Mandarin varying pitch levels on each individual syllable (tone) makes for difference in meaning, whereas it has no phonemic significance in English words.

/tāmən/ (they) —> /tām/, /tìti/ —> /tì^{t}/ (cf. C. F. Hockett, "Peiping Morphophonemics," Language [XXVI, 1950], 63-85; also cf. Wong, p. 271). Since such a phenomenon mostly occurs in polysyllables, more discussion will be found in the next chapter.

CHAPTER III

THE PROSODIC FEATURES OF BOTH LANGUAGES

3.1 The Prosodic Features of American English

3.11 The Prosodic Features of Polysyllabic Words

3.111 The Patterns of Polysyllabic Words

So far only the structure of monosyllables has been discussed. However, as mentioned earlier, human speech is simply a continuous sequence of such monosyllables with its simultaneous prosodic features. In the flow of speech, such monosyllables tend to occur either by themselves alone or in combination with one or more monosyllables in order to form a morphological unit for carrying out their meanings. The former structure is generally called a monosyllabic word; which has already been treated in the last chapter; the latter is usually called the polysyllabic word. In English, the permissible combinations of the latter words present a very complex picture, for they usually contain from two to eight monosyllables. The types of such combinations (with example words) can be given as follows:[1]

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[1] Of course there are words that are longer than eight syllables, such as _antidisestablishmentarianistically_, but there is no need to make an exhaustive study of them here.

TABLE XXVII

THE PATTERNS OF POLYSYLLABIC WORDS

Types	Example Word	
disyllables	method /mɛθəd/	Sunday /səndI/
trisyllables	potato /pəteto/	afternoon /æftərnun/
4 syllables	peninsula /pənInsələ/	application /æpləkešən/
5 syllables	anniversary /ænəvərsərI/	representative /rɛprIzɛntətIv/
6 syllables	encyclopedia /InsaIkləpidIə/	involuntarily /Invaləntɛrəl I/
7 syllables	unilateralism /junIlætərəlIzəm/	
8 syllables	internationalization /Intərnæšənl̩əzešən/	

Phonologically one of the most significant features of these polysyllabic words is the degree of stress occurring on each syllable. Unlike the monosyllabic word, which usually possesses a strong or primary stress when spoken out of context, polysyllabic words may have as many degrees of stress as syllables, but some of the differences are slight or even imperceptible. Most linguists are concerned only with those differences of stress that function in differentiating the meaning of polysyllabic words. Of these there are three degrees of stress generally agreed upon by scholars in the analysis of so-called "syllabic stress," namely, primary stress, mid stress and weak stress.[2]

3.112 The Patterns of Syllabic Stress

Strictly speaking, there are no infallible rules for determining which syllable of a word should bear the primary stress or weak stress. In English every lexical, derivational and inflectional element has stress characteristics as an essential part of its phonetic form. These stress characteristics may vary according to the morphologic and syntactic environments in which the elements occur. A careful examination of such characteristics of syllabic stress shows the following principal stress patterns, called inherent stress patterns.

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[2] Most linguists would agree that there are two kinds of stress, i.e. syllabic stress and phrase stress (including sentence stress) in American English. The former represents the relative prominence of syllables within the word; i.e., word stress; the latter, the relative prominence of words within phrase or sentence. However, the differences of the degrees of stress in English have long been the object of debate. As mentioned earlier, Trager-Smith believe that there are four degrees of stress existing in American English, namely, primary, secondary, tertiary and weak (cf. Trager-Smith, pp. 35-39). Stanley S. Newman concludes that three phonemic classes with six varieties of stress can be distinguished in English; that is, heavy stress including nuclear heavy and subordinate heavy, middle stress including full middle and light, and weak stress including sonorous weak and pepet weak (cf. "On the Stress System of English," Word [II, 1946], 171-187). Such analyses apply to both syllabic stress and phrase stress. But for polysyllabic words, most scholars tend to believe that there are no more than three degrees of stress (cf. Daniel Jones, pp. 248-261; Robert A. Hall, Jr., Introductory Linguistics [New York, 1964], p. 109; Norman C. Stageberg, An Introductory English Grammar [New York, 1965], p. 45. Hans Kurath, A Phonology and Prosody of Modern English [Ann Arbor, 1964], p. 141: "full stress, half-stress, unstress"). Such a treatment tends to interpret what Trager-Smith call the "secondary stress" as an allophonic variant of a primary stress. For teaching purposes three levels of word stress and four levels of phrase stress will be used in the present description.

3.1121 Disyllabic words

Generally speaking, there are four stress patterns of disyllabic words which are commonly found in English. Using an acute mark /´/ for primary stress, a grave mark /ˋ/ for mid stress, and a breve mark /˘/ for weak stress, these stress patterns with their example words can be given in the following table:

TABLE XXVIII

STRESS PATTERNS OF DISYLLABIC WORDS

Stress Patterns	Transcriptional Symbol	Examples	
a. Primary+Weak	/´˘/ or /´_/	never /nɛ́və̆r/	table /tébl̩̆/
b. Weak+Primary	/˘´/ or /_´/	invent /Ĭnvɛ́nt/	before /bĬfór/
c. Primary+Mid	/´ˋ/	headache /hɛ́dèk/	output /aÚtpÙt/
d. Mid+Primary	/ˋ´/	upset /ə̀psɛ́t/	outrun /aÙtrə́n/

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[3] In addition to the four stress patterns of disyllabic words indicated above, there is a so-called "double stress" (level stress) pattern regularly accepted by the older grammars. However, this stress pattern is still a matter of dispute, and is often modified in a sentence. The first of the stressed syllables tends to lose its stress when closely preceded by another stressed syllable; similarly the second of the stressed syllables tends to lose its stress when closely followed by

In English the great majority of disyllabic words belong to the stress patterns "a" and "b." Since the stress feature constitutes a part of the distinctive form of meaningful elements, a large group of disyllabic words can differentiate their morphologic nature by means of changing their stress patterns, the most important of which are the nouns and verbs that are differentiated solely by stress. In all such cases, the noun forms fall under stress pattern "a" /´˘/, e.g. concert /kánsə̆rt/; the verb forms on the stress pattern "b" /˘´/, e.g. concert /kănsə́rt/.

In addition, the stress patterns presented above correlate closely with complex disyllabic words. Such complex words generally fall into two formations:[4]

a. Prefix+Base morpheme

b. Base morpheme+Suffix

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another stressed syllable. The word fifteen, for example, has a double stress /´´/ spoken in isolation. When it is used before a syllable with primary stress, as in

Thère are fífteen mén in thìs róom

only the first syllable of the word receives major stress. However, when it occurs in a sentence such as

Hè's júst fìftéen

the primary stress falls on the last syllable of the word. Therefore, the author regards it here as either pattern "c" or pattern "d."

[4] Generally speaking, complex words differ from compound words. In this study, for teaching purpose, the author would simply treat the former as a word which is composed of a base morpheme plus either a prefix or a suffix, or both; the latter, a word made up of two (or more in a very vew cases) free bases.

The more frequent occurrences of such prefixes and suffixes in English can be found in the following table.

TABLE XXIX

ENGLISH PREFIX AND SUFFIX

Prefix	Base Morpheme	Suffix
a-		-able
be-		-age
co-		-al
de-		-ana
dis-		-dom
e-		-ed
em-		-ee
en-		-er
ex-		-es
il-		-ese
im-		-ess
in-		-est
ir-		-ful
mal-		-hood
mis-		-ial
non-		-ic
per-		-ing
pre-		-ion
pro-		-ish
re-		-ism
sub-		-ity
tri-		-ive
un-		-less
up-		-like
		-ly
		-ment
		-ness
		-or
		-ous
		-ow
		-ship
		-sion
		-some
		-tia
		-tion

The prefixes and suffixes listed above are all monosyllables which are attached to a base morpheme in initial position and in final position; there are several prefixes and suffixes which contain two syllables, such as "anti-," "inter-," "over-," "ultra-," "under-," "-ical," "-ious," and so on, which will be included in the analysis of the trisyllabic words and the words of more than three syllables. The primary stress of such disyllabic formations, most of the time, falls on the base morpheme. The prefix and suffix syllables often receive weak stress or sometimes mid stress, or even primary stress, depending on the morphological structure of polysyllables. Therefore, the disyllabic words with prefixes usually have the stress pattern "b" (/˘ˊ/ end-stress), e.g. *beloved* /bIlə́vḍ/, *arise* /əraÍz/. Stress pattern "d" occasionally occurs in such words as *mislead* /mIslid/, *uproot* /ə̀prút/. On the other hand, disyllabic words with suffixes often have stress pattern "a" (/ˊ˘/ fore-stress), e.g. *hated* /hétĬd/, *friendly* /frέndlĬ/, *reader* /rídə̆r/, *harmful* /hármfə̆l/. Stress pattern "c" also frequently occurs in such formations as *childhood* /čaÍldhŬd/, *godlike* /gádlàIk/.[5]

As for the compound words, since such words are formed of two free bases, the stress pattern is quite different from complex words. In general, most of these words contain a single primary stress on one element of the compound, the other element carrying mid stress. The most common pattern of such disyllabic words is stress pattern "c," with patterns "d" They can be shown in the following table.[6]

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[5] Cf. Kurath, p. 142.

TABLE XXX

STRESS PATTERNS OF COMPOUND WORDS

Pattern of Compound Words	Examples	Stress Pattern "c"	Stress Pattern "d"
Noun + Noun (or noun stems)	airport	$/\acute{-}\grave{-}/$	
Adjective + Noun	blackbird or black bird	$/\acute{-}\grave{-}/$	$/\grave{-}\acute{-}/$
Nouns based on verb phrases	breakdown	$/\acute{-}\grave{-}/$	
Compound adverbs	homeward	$/\acute{-}\grave{-}/$	
Noun + Adjective or participle	seasick	$/\acute{-}\grave{-}/$	

3.1122 Trisyllabic words

There are seven stress patterns commonly found in the trisyllabic words of English.[7] They can be shown with their example words as in the following table:

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[6] In some cases the two parts of the compound can function separately as words; in this case the stress patterns would follow the rules for phrase stress (e.g., black bird) (cf. Kurath, pp. 143-144; also A. C Gimson, An Introduction to the Pronunciation of English [London, 1962], pp. 224-225, and Jones, p. 954.

[7] Cf. Gimson, pp. 222-223.

TABLE XXXI

STRESS PATTERNS OF TRISYLLABIC WORDS

Stress Pattern	Transcriptional Symbol	Example	
Mid+Weak+Primary	/ˋ˘ˊ/ - - -	entertain /ɛ̀ntə̆rtén/	secondhand /sɛ̀kə̆ndhǽnd/
Primary+Weak+Weak	/ˋ˘˘/ - - -	bachelor /bǽčə̆lɚ̆/	
Primary+Weak+Mid	/ˊ˘ˋ/ - - -	telephone /tɛ́lə̆fòn/	office-boy /ɔ́fĬsbɔ̀I/
Weak+Primary+Weak	/˘ˊ˘/ - - -	encounter /ĬnkáUntɚ̆/	
Mid+Primary+Weak	/ˋˊ˘/ - - -	uncertain /ə̀nsə́rtn̥̆/	goodlooking /gÙdlÚkĬŋ/
Weak+Primary+Mid	/˘ˊˋ/ - - -	embargo /Ĭmbárgò/	
Primary+Mid+Weak	/ˊˋ˘/ - - -		grandfather /grǽndfàðə̆r/

It is to be noted that compound words containing three syllables usually follow the stress patterns /ˋ˘ˊ/, /ˊ˘ˋ/, /ˋˊ˘/ and /ˊˋ˘/.

3.1123 Four syllable words

Eight stress patterns of four syllable words can be given as follows:[8]

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[8] This table is adapted from A. C. Gimson, pp. 222-223.

TABLE XXXII

STRESS PATTERNS OF FOUR SYLLABLE WORDS

Stress Pattern	Transcriptional Symbol	Example
W+P+W+W	/-̆-́-̆-̆/	remarkable /rĬmárkə̆bl̩̆/
M+P+W+W	/-̀-́-̆-̆/	unfortunate /ə̀nfɔ́rč̆ə̆nĬt/
W+P+W+M	/-̆-́-̆-̀/	acclimatize /ə̆kláImə̆tàIz/
M+W+P+W	/-̀-̆-́-̆/	diplomatic /dÌplə̆mǽtĬk/
P+W+W+W	/-́-̆-̆-̆/	cowardliness /káUărdlĬnĬs/
P+W+M+W	/-́-̆-̀-̆/	helicopter /hɛ́lĬkàpt˘/
P+W+W+M	/-́-̆-̆-̀/	counterattack /káUntə̆rə̆tæ̀k/
M+W+W+P	/-̀-̆-̆-́/	aquamarine /æ̀kwə̆mə̆rín/

3.1124 Five syllable words

Five stress patterns of five syllable words can be found in English, as in the following table:[9]

TABLE XXXIII

STRESS PATTERNS OF FIVE SYLLABLE WORDS

Stress Pattern	Transcriptional Symbol	Example
W+M+W+P+W	/-̆-̀-̆-́-̆/	consideration /kə̆nsÌdə̆réš̆ə̆n/
M+W+W+P+W	/-̀-̆-̆-́-̆/	antimacassar /æ̀ntĬmə̆kǽsɚ̆/
M+W+P+W+W	/-̀-̆-́-̆-̆/	aristocracy /æ̀rə̆stákɪə̆sĬ/
M+W+P+W+M	/-̀-̆-́-̆-̀/	rehabilitate /rìə̆bÍlə̆tèt/
W+M+W+W+W	/-̆-́-̆-̆-̆/	empiricism /ɛ̆mpÍrə̆sĬzə̆m/

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[9] Cf. Gimson, p. 223.

3.1125 Six syllable words

There are five stress patterns of six syllable words in English as follows:[10]

TABLE XXXIV

STRESS PATTERNS OF SIX SYLLABLE WORDS

Stress Pattern	Transcriptional Symbol	Example
W+M+W+P+W+W	/-̆-̀-̆-́-̆-̆/	inferiority /ĬnfÌrĬɔ́rə̆tĬ/
M+W+W+P+W+W	/-̀-̆-̆-́-̆-̆/	variability /vɛ̀rĬə̆bÍlə̆tĬ/
M+W+P+W+W+W	/-̀-̆-́-̆-̆-̆/	ceremoniously /sɛ̀rə̆mónĬə̆slĬ/
M+W+W+W+P+W	/-̀-̆-̆-̆-́-̆/	palatalization /pæ̀lə̆tĬə̆zéš̆ə̆n/
W+M+W+W+P+W	/-̆-̀-̆-̆-́-̆/	identification /ăIdɛ̀ntə̆fə̆kéš̆ə̆n/

3.1126 Seven or eight syllable words

The most common stress pattern for 7 or 8 syllable words can be listed in Table XXXV.[11]

A brief review of the stress patterns of polysyllabic words shows that there are several peculiarities which are worth pointing out. First, since the presence of a primary stress is one of the phonemic feature which identifies the word or free morpheme of English, any kind of polysyllabic word must contain one primary stress. Such a stress, however,

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[10] Cf. Gimson, p. 223.

[11] Cf. Gimson, p. 224.

TABLE XXXV

STRESS PATTERNS OF SEVEN OR EIGHT SYLLABLE WORDS

Stress Pattern	Transcriptional Symbol	Example
M W P W W W W	/-̀-̆-́-̆-̆-̆-̆/	unilateralism /jùnĬlǽtə̆rə̆lĬzə̆m/
M W M W P W W	/-̀-̆-̀-̆-́-̆-̆/	unreliability /ə̀nrĬlàĬə̆bÍlə̆tĬ/
W M W P W W W	/-̆-̀-̆-́-̆-̆-̆/	enthusiastically /ĬnθjùzĬǽstĬkə̆lĬ/
W M W W W P W	/-̆-̀-̆-̆-̆-́-̆/	industrialization /Ĭnd`strĬə̆lə̆zés̆ə̆n/
W M W W P W W	/-̆-̀-̆-̆-́-̆-̆/	impenetrability /Ĭmpɛ̀nə̆trə̆bÍlə̆tĬ/
M W M W W W P W	/-̀-̆-̀-̆-̆-̆-́-̆/	internationalization /Ìntə̆næ̀s̆ə̆nl̆ə̆zés̆ə̆n/

is not a constant, but merely a potential feature of the word. Moreover, the entities of polysyllabic words are not only identified by the intensity of the primary stress itself, but also by the contrasting mid and weak intensities occurring within each polysyllabic word.

Secondly, a great number of polysyllabic words composed of more than two syllables often contain affixes. Such formations of polysyllabic words may have a single prefix or the negative prefix "un-" before a single prefix, e.g. unforeseeability; or several suffixes which occur in sequence

3

and stand in a fixed order, as in the word *internationalization*. In the stress patterns of such formations although they vary greatly, there is a general tendency showing that in the polysyllabic words of native English, the primary stress remains on the root syllable; mid and weak stress fall on affix-syllables, such as the series *believe* /bəlIv/ (/˘´/), *believing* /bəlIvIŋ/ (/˘´˘/), *unbelieving* /ənbəlIvIŋ/ (/`˘´˘/), *unbelievingly* /ənbəlIvIŋlI/ (/`˘´˘˘/). But in the polysyllabic words of Greek or Latin origin such as the series *photograph* /fotəgræf/ (/´˘`/), *photographer* /fətagrəfər/ (/˘´˘˘/), photographically /fotəgræfIkIlI/ (/`˘´˘˘˘/) and *photogravure* /fotəgrəvjUr/ (/`˘˘´/), the primary stress shifts from one syllable to another as the word is lengthened. The former is called the fixed or recessive stress of the native English and Germanic tradition, and the latter, free or variable stress of the Greco-Latin tradition.[12]

In sum, syllabic stress is a part of English structure. Its stress pattern depends, in standard speech, on the conventions and traditions developed by the interplay of various forces in the history of each word. In most words, the convention is fixed, and any departure from the accepted stress pattern is branded as substandard, and sometimes causes misunderstanding. In a few words the convention is not fixed, with some variation occurring in standard speech. Most of the variations are dialectal.

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[12] Cf. C. K. Thomas, *An Introduction to the Phonetics of American English* (New York, 1958), p. 146.

3.12 The Prosodic Features of the Phrase and Sentence

3.121 Stress

3.1211 Phrase stress

A sequence of syllables which consists of more than one word forming a minimal unit of syntactic structure is usually termed a "phrase." Such a structure in the continuous flow of speech has its prosodic features. The most prominent one, as in polysyllabic words, is stress. In English the great majority of phrases normally have the heaviest stress at or near the last syllable of the phrase.[13] In the division of such phrases into two parts, head and modifier, using the system of four degrees of stress,[14] the structure of the phrase generally falls into two main categories: the head of the phrase follows the modifier or the modifier follows the head of the phrase. Both have the same stress pattern: end-stress.[15] Examples of such phrases can be given as follows:[16]

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[13] Cf. Kurath, p. 139.

[14] In an analysis of the English phrase and sentence, the system of four degrees of stress is widely used. This is indicated as follows: /´/ primary stress, /^/ secondary stress, /`/ tertiary stress, and /˘/ weak stress (cf. Trager and Smith, p. 50).

[15] Cf. Kurath, pp. 139-140.

a. Modifier + head

Noun phrase:

âll mỳ bóoks

lîght grâystòne wálls

twô-hùndred yêar-òld hóuse

Prepositional phrase:

òut ŏf Éngland

ìn the wést

wìth her fâther's consént

Verb phrase:

(we) mày gó

(I) càn trý

(he) wàsn't to gó

Adjective phrase:

vèry lóudly shóuting

sîx yèars óld

a lìttle tíred

Adverb phrase:

mòre néarly

mûch tòo fást

vèry mùch mòre nèarly thóroughly

b. Head + modifier

Noun phrase:

the attôrney géneral

---

[16] The examples of phrases are taken from Hill's Introduction (cf. p. 178, 180, 185, 195-201, 234-239, 245, 251, 353, 397), and Kurath's (cf. pp. 139-140).

the Univêrsity of Míchigan

the bôoks on the táble

Verb phrase:

rûn fást

côuldn't dô súch

gîve him a séat

Adjective phrase:

gôod as góld

brîghter than the sún

too lâte for the cóncert

Adverb phrase:

as quîckly as póssible

fâster than líghtning

nôt at áll

In addition, when the phrase consists of two coordinate heads, it also bears the pattern of end-stress, such as

gòod and bád

fìne and óld

sòns and dáughters

However, there are two constructions of phrases that are exceptions to the rule that the last word bears the primary stress:

a. When a verb is followed by one or two pronominal objects or by a prepositional phrase containing a noun, the primary stress is on the verb as in:

(Don't) sáy thàt

(She) tóld me thàt

(He) gáve it to mè

b. When a preposition is followed by a pronoun, the primary stress is on the preposition, as in:

(What) óf it

(John is) agáinst me

(We saw) thróugh him[17]

3.1212 Sentence stress

A sentence is a higher structural unit of speech. It is composed of a sequence of words or phrases. The prosodic feature of stress belongs to the sentence as well as to its constituent parts. As mentioned earlier, words and phrases have their inherent stress patterns, as *table* /-́-̆/, *entertain* /-̀-̆-́/, and *all my books* /-̂-̀-̆/. Such inherent stress patterns do not conflict with the sentence stress. However, since the precise manifestation of these inherent patterns is determined by the prosodic features of sentences which are composed of intonation, timing and stress, the realization of such inherent patterns is closely correlated with the syntactic structure of the sentence as a whole. The relation between sentence stress and its word or phrase stresses can be generalized in the following points.

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[17] Cf. Kurath, p. 140.

a. The stress patterns of sentences, in general, are freer than those of the words or phrases and are largely determined by the meaning which they are intended to convey; some words are predisposed due to their function in the sentence to receive strong stress; other words are more likely to be unstressed. As a general rule it may be said that the more important a word is in a sentence, the stronger is its stress. These "content" or "lexical" words such as nouns, adjectives, demonstrative and interrogative pronouns, main verbs and adverbs are more important. Such words are therefore generally strongly stressed receiving the sentence-stress. Other categories of "function" or "form" (grammatical) words such as auxiliary verbs, conjunctions, prepositions, pronouns, relative pronouns and certain adverbs are less important and therefore less strongly stressed or unstressed. The following example may display these peculiarities as such:

> For a mân to márry, èven at the còst of sácrifice,
> ìs bêtter than to búrn.[18]

The number of syllables stressed by the speaker depends largely upon the nature of the words composing the sentence. Thus, a sentence containing a high percentage of content words is likely to receive more stresses than one with the same number of syllables but a higher proportion of form words.

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[18] This example is taken from Hill's *Introduction* (cf. p. 269). The weak stress of this sentence is unmarked.

b. Shifting stress of polysyllabic words even more often occurs in the sentence than in their isolated pronunciation.[19] Such a change in the pattern of a word may result from the desire to intensify the contrast in similar words, from the presence or absence of stress in neighboring words of a sentence, from the presence of stresses that appear differently in special syntactic structure, or as the impressions or desires of the speaker necessitate his making such changes. A word like unknown /˘ ´/, for example, has a primary stress on the last syllable. When it occurs before a stressed syllable, as in

The ûnknòwn thíef is still ùnknówn.

Its primary stress is shifted toward the front of the word. Such a front-shifting is because the following word thief receives the primary stress in the sentence. In other positions, the stress pattern of a polysyllabic word is toned down, but not effaced, as in

Yòu têll your fáther vs. Your fàther knóws it.

c. A great number of monosyllabic function words are subject to qualitative change according to whether or not they receive the stress in sentences. Such qualitative changes are of variant phonemic shapes. In general, the full variant occurs under strong stress, and the reduced variant in unstressed syllables. The prosodically conditioned variants of such function (or form) words are given as follows:[20]

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[19] The following discussion is based on the analyses of Kurath (cf. pp. 138-140) and Norman C. Stageberg, An Introduction to English Grammar [New York, 1965], p. 47.

Auxiliary verbs:

	Stressed forms	Unstressed forms
am	/æm/: /Indid aI æm/	/əm/: /aI əm rɛdI/
		/m/: /aım rɛdl/
is	/Íz/: /aI θIŋk It ız/	/Iz/: /ðə græs Iz wɛt ðI ɛǰ Iz dɔl/
		/z/: /ǰoz hIr náU/
are	/ár/: /jɛs ðe ar/	/r/: /ðèr hIr/
was	/waz/: /aI nlú hwat It waz/	/wəz/: /hi wəz ɔl əlon/
were	/wər/: /hi nIu hwær ðe wər/	/wər/: /ɔl ðə mɛn wər gɔn/
have	/hæv/: /ðæts ɔl aI hæv/	/həv/: /aI həv sin Im/
		/əv/: /ðe wUdn̥t əv gɔn/
		/v/: /aIv lɔst It/
		/ə/: /ðe wUdn̥t ə gɔn/
has	/hæz/: /hi hæz ðə buk/	/həz/: /marθə həz faUnd It/
		/əz/: /ðə tren əz kəm/
		/z/: /hiz jəst kəm/ (after voiced sounds except the sibilants)
		/s/: /ǰæks kəm/ /after voiceless consonants except the sibilants

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[20] Cf. Kurath, p. 142, and Kenyon, pp. 151-157.

can	/kæn/:	/du ɔl jU kæn/	/kən/:	/aI kən du vɛrI lItl̩/
			/kn̩/:	/aI kŋ̩ go/

Pronouns:

I	/aI/:	/aI nIu Im ət wənts/	/ə/:	/aI dId ɔl ə kUd/ (in careless speech)
he	/hi/:	/hi æskt mI ə fevr̩/	/hI/:	/aI nIu hI kUd/
			/i/:	/hi θɔt i ɔt tə go/
			/I/:	/hi θɔt I sɔ It/
you	/ju/:	/ju ɔr ðə mæn tə go/	/jU/:	/pərhæps jU kæn/
			/jə/:	/haU də jə du/
us	/ʌs/:	/wi sɔ ðem bIfor ðe sɔ ʌs/	/əs/:	/hi sɔ əs bət dIdn̩t spik/
			/s/:	/lɛts rɛst naU/
him	/hIm/:	/gIv It tə hIm nat tə mi/	/Im/:	/aI mɛt Im ət tu/

Adverbs:

not	/nat/:	/hiz nat hIr jɛt/	/nət/:	/əlæs aI kænət go/
than	/ðən/:	/nat bɛtr̩ ðən bət əz gUd æz ðIs/	/ðən/:	/mor ðən ɛvr̩/
as	/æz/:	/æz i kem/	/əz/:	/jəst əz gUd/

Prepositions:

for	/fɔr/:	/hi gat hwat i æskt fɔr/	/fər/:	/hi kem fər ðə bUk/
of	/av/:	/hwat Iz It med av/	/əv/:	/ðI ɛnd əv ðə wik/
to	/tu/:	/ðIs wəz ædId tu It/	/tə/:	/rɛdI tə go/

Conjunctions:

but	/bʌt/:	/bʌt In ðæt kes jU du/	/bət/:	/ɔl bət tu/

and	/ænd/:	/ænd IndId aĬ šUd/	/ənd/:	/sno ənd aIs/
			/n̩/:	/rad n̩ gən/
or	/ɔr/:	/ɔr If ju čuz tek ðIs/	/r̩/:	/wən r̩ ðI əðr̩/

d. Generally speaking, English sentence-stress is a sequential alternation of strong and weak syllables in the flow of speech. In such a process of alternation, the number of weak syllables tends to exceed that of those carrying strong stress. However, the latter often keeps recurring at regular intervals; therefore, the more unstressed syllables there are between stress syllables, the more rapidly they are pronounced. Polysyllabic words, containing one strong syllable when spoken in isolation, carry a primary or secondary stress on that syllable in connected speech. The weak syllables are so unimportant, rhythmically speaking, that they are not distinguishable as separate syllables.

3.122 Juncture

3.1221 Syllabic separator[21]

In the continuous flow of speech, there often occurs a break or a pause between the words, phrases, or sentences in order to make the meaning of such syntactic units clear. The so-called "double stress" as mentioned earlier does not have two equal primary stresses in connected speech unless the two parts are separated by a break or pause between them. In trying to pronounce ex-president, nonstop, and subdean, one will tend to separate the stressed syllables from each other as when one says good morning, well done, and black bird. Such a break or pause separating the two syllables of the same word or of adjacent words is called "syllabic separator" in this study, though it is usually termed "open juncture" (or internal open juncture) by linguists. On the contrary, monosyllabic words and a great number of other polysyllabic words have no such feature. In words like boy, student and professional, no break occurs either between any of the sounds of each word or between the syllables of the last two words. The lack of any break or pause between sounds or between syllables results in a normal transition between sounds. Such a phenomenon is called close juncture. It is nonphonemic in connected speech. In transcriptions it is indicated simply by putting the phonemic symbols together, without intervening juncture.

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[21] The discussions on juncture are so numerous that it would be difficult to give footnote credit. The discussion below is taken in pieces from many sources. The term adopted here is from Hill's "Non-Grammatical . . . ," p. 332.

Unlike close juncture, the syllabic separator (open juncture) has a phonemic function. It is indicated by a plus sign /+/ and is sometimes called plus juncture. The following minimal pairs will show the differential meanings due to such a syllabic separator.

1 a. nitrate /náItrèt/
b. night-rate /náIt+rêt/
2 a. it swings /Ìt+swÍŋz/
b. its wings /Ìts+wÍŋz/

The first pair has the same segmentals and almost the same stress, but the meaning of such pairs is different since the ways of getting from /t/ to /r/ in *nitrate* and in *night-rate* are not the same. After the /t/ of *nitrate*, there is a puff of breath and a whistling sound of friction which do not occur in *night-rate*. In other words, the way of getting from /t/ to /r/ in *nitrate* is the close juncture between the two sounds, whereas there is a syllabic separator or open juncture between them in *night-rate*.

In the second pair, both have a syllabic separator between the two words, but each occurs in a different place. Such a phenomenon makes the two sounds /s, w/ of this pair different and thus signals different meanings. The initial /s/ of *swings* is longer than the final /s/ of *its*. The second is a kind of assimilation. In *wings* the /w/ is voiced, as it normally is in initial position, but in *swings* the /w/ is wholly or partly developed because of the preceding voiceless /s/.

3.1222 Terminals

So far only the break or pause occurring between words or between two meaningful parts of a single word has been discussed. As mentioned above, such a break or pause also occurs between phrases or sentences. When it does so, it is characterized by pauses of varying length, with various levels of pitch. Since such pauses always occur at the end of grammatical units or sentences, the term "terminal" or "terminal juncture" is used by linguists. There are three kinds of such terminals in actual speech. The first one is the falling terminal. It has a falling inflection and is characterized by the combination of at least three features: a downturn of pitch on the last syllable or syllables, a considerable prolongation of the preceding syllable of ending word, and a fading of the voice into silence on the last syllable. It is often symbolized, appropriately enough, by a down-pointing arrow /↓/.[22] Such a terminal is normally found at the end of statements or statement-equivalents, at the end of some requests and very frequently at the end of questions that begin with question-markers like "who" or "where":

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[22] Falling terminal, is also symbolized by /#/, called double cross juncture. Rising terminal, is symbolized by /‖/, called double bar juncture. The sustained terminal is represented by /|/, called single bar juncture. For easy understanding, the author chooses the arrow symbolization as described in the text. Like the discussions on plus juncture, the discussions above and below are based on so many similar sources that proper footnoting would be very difficult.

a. I'm going home ↓

b. Go home ↓

c. Who's at the door ↓

The second terminal is the rising terminal. It is distinguished from the first one by a "rising inflection," that is, a slight lengthening of the stressed syllable and a slight rise in pitch on the last syllable just before the pause. It is often marked by an up-pointing arrow /↑/. Such a terminal is found not only at the end of a question that calls for affirmation or denial, but sometimes also at the end of certain syntactic units within a sentence, as in

a. Should I get a new book ↑

b. One ↑ two ↑ three ↑ four ↓

c. He came ↑ saw ↑ and conquered ↓

The third terminal is called a sustained terminal, since the level of pitch has neither upturn nor downturn, but remains unchanged and is accompanied by lengthening and fading followed by a pause. At this kind of terminal, the loudness of speech is often reduced, and the speed is slowed down. It may be called a "level" terminal and is symbolized by a horizontal arrow /—>/. Such a terminal can be shown in the following sentence:

He went home early —> he had such a headache ↓

3.123 Pitch and Intonation

3.1231 Pitch

As with degrees of stress, there are actually many slight variations in pitch from one syllable to another. However, many of these variations do not affect the meaning; they may be considered as allophones of the same pitch phoneme. Four levels of pitch are usually recognized in connected speech. These four are as follows:

/4/	extra-high
/3/	high
/2/	normal
/1/	low

This is to say, the pitch level of American English is from /1/, the lowest pitch which a speaker uses, to /4/, the highest. The pitch /2/ is the normal level of speaking and serves as a kind of base line for normal conversation from which departures are made upward and downward. Pitch /3/ often gives words special attention and is normally used for the stressed syllables of the utterance. Pitch /4/ is usually reserved for very special emphasis, and pitch /1/ is commonly used for the unstressed and lesser stressed syllables toward the end of the utterance. In the speech used for special occasions there is a considerable amount of variation in the use of pitch, as in these examples:[23]

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[23] These examples are taken from Sledd's A Short Introduction (cf. p. 30).

2 3 2 1 1 1
a. Good morning —> Mister Jones ↓ (rather formal)

2 3 2 1 1 1
b. Good morning —> Mister Jones ↑ (a bit more friendly)

2 3 1
c. Good morning ↓ (polite, though colorless)

2 4 2
d. Good morning ↓ (an exclamation of shocked surprise)

4 1 1 1 1 1
e. Good morning —> Mister Jones ↑ (very lively and kittenish)

3.1232 Intonation

Intonation is the tune of the sentence or of the phrase. The distinguishing feature of such tunes is the behavior of the pitch levels rising and falling on the stressed syllable and the weak syllables with the accompanying terminal junctures. There are no pitchless sentences, and no sentences without terminals; and stresslessness in a sentence is impossible, since English has a stress-timed rhythm. The three prosodic features mentioned above are all closely related to the tune of the sentence; consequently, they compose the so-called intonation contour.

Generally speaking, there are three kinds of intonation contours commonly used in American English.[24] The most frequent intonation is the rise-fall contour, since this contour ends with a falling terminal, which, as mentioned earlier, is commonly used in making a simple statement of fact, issuing a command, or asking a special question which requests special information. In such an intonation contour, there is at least one syllable with a primary stress which commonly has a high pitch /3/, or an extra-high pitch /4/ when special emphasis is desired. All the preceding unstressed or less strongly stressed syllables are normally spoken with pitch /2/. The falling terminal ends the

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[24] Studies of English intonation have been made for a rather long time. Henry Sweet devised a symbolism to indicate a rising tone [ˊ], heard in questions such as what ˊ a falling [ˋ], in answer to questions such as no ˋ; a falling-rising [ˇ], as in take care ˇ; and a rising-falling

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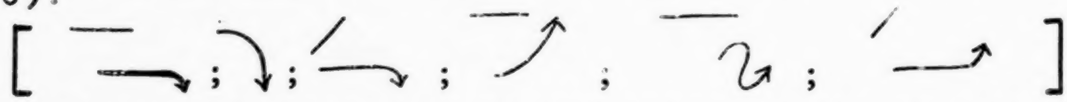
[⋀], for sarcasm as in Oh! ⌒. He also indicated the possibility of level tones, high or low, with greater intervals between them. In 1922 Harold E. Palmer, in his English Intonation, took a great step forward. He discovered that the sentence could be broken into several parts of one or more syllables each, and that each part might have its own intonation contributing to the whole. These parts he called the "nucleus," "head," and "tail" of the intonation. Later, for teaching English to foreigners, he tried to gain simplicity by eliminating free combinations of the two parts of the sentence and substituting for them a group of six fixed combinations (cf. Palmer, Cambridge, 1922, pp. 7, 10, 17; and Pike, p. 6):



The most complete and authoritative study on this subject was Pike's The Intonation of American English, in which he describes thirty different "primary intonation contours." However, such a description of intonation becomes too complicated to be of much practical value to a foreign student learning English. The author, using grammatical construction and logical sense, prefers the most common intonation contours which are generally accepted by language teachers rather than Pike's "moods" and "points of view."

utterance. This contour may be transcribed as follows:[25]

a. Simple statement of fact (declarative sentences)

2 3 1
John went fishing ↓

b. Command

2 3 1
Come see me ↓

c. Questions which begin with an interrogative word[26]

2 3 1
What's the matter ↓

The second common intonation is the rising intonation contour. Unlike rise-fall intonation, this contour always has a rising terminal. As indicated before, it is normally used for one of three purposes: a question which does not begin with an interrogative word, that is, a question which may be answered merely by yes or no; or in a statement of fact which is spoken with a questioning tone; or after certain grammatical units in a sentence. The speaker's voice, with such intonation, goes up to a high pitch level /3/ on the last stressed syllable but as the stress trails off the pitch remains high for the rising terminal at the end of the sentence. This contour is marked /2 3 3 ↑ / with examples as follows:

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[25] In marking the intonation contour, there are several different systems being used in language teaching. One is that using the height of the line above or below the printed words to indicate the phonemic levels of English intonation. Such a base line notation was developed by K. L. Pike, and has been modified in various ways and used by many. Ending a pattern with a tail indicates a final fade-out terminal, which is one of these modifications. Another system of using dots on a scale as a pseudo musical notation has been developed by Kenneth L. Croft and adapted by some scholars. The author, using Trager and Smith's number system, adopts the arrow signals to mark intonation. Such a system may take a little longer for the students to master, but once learned, it is effective because of its simplicity.

[26] Grammarians call these "special questions" and distinguish them from "general questions," which do not begin with an interrogative word. General questions (such as *Are you coming*?) may be answered by "yes" or "no"; special questions (such as *What time is it*?) require more specific information as an answer.

a. Yes-or-no question in question form

    2   3 3
    Are you ready ↑

b. Yes-or-no question in statement form

    2   3 3
    He's coming ↑

c. Initial grammatical phrase

    2   3 3
    In short ↑

    2   3 3
    If you'll wait ↑

In addition, there is another contour also commonly used in American English. That is the incomplete intonation contour. This contour is really the prefinal section of an utterance, and indicates that this is not the end of the intended utterance. This intonation contour always ends with the sustained terminal, which means that before a slight pause such a contour does not end by dropping to pitch level /1/ and fading off into silence; instead it tends to sustain the previous pitch level. This contour is marked /2 3 2 —>/; the examples for these contours are as follows:

```
     2           3  2      2              3 1
a.  You say it's easy —> but you won't try it ↓
      2         3  2        2        3   1
b.  When it's pleasant —> we study outdoors ↓
    2       3 2       2            3   1
c.  In our town —> they have two colleges ↓
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3.2 The Prosodic Features of Mandarin Chinese

3.21 The Prosodic Features of Polysyllabic Units

Since in Chinese every word consists of only one syllable which is basically a free morpheme,[27] the monosyllabic myth of Chinese language has been widely held by many scholars for a rather long time.[28] However, in actual speech, such monosyllabic words are not only uttered independently, but often combinations of two or more monosyllabic words forming polysyllabic units which convey certain meanings. For the former monosyllabic words, a term zi (4th tone) is commonly used by Chinese grammarians. Examples of such zi are ri (4th tone) "day," teu (2nd tone) "head," shau (3rd tone)

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[27] That is, in Chinese, every monosyllabic word can stand alone, and means something.

[28] Perhaps John Webb was the first scholar who held the faith that Chinese speak wholly in monosyllables. In 1668 he completed An Historical Essay Endeavoring a Probability That the Language of the Empire of China is the Primitive Language and pointed out: "Our Chinique is a language that consists all of monosyllables, not one dissyllable, or polysyllable being found in it." Finck's classification in 1910 of the types of human language included the statement that "Chinese words consist, not absolutely always, but in the majority of cases, of a single syllable" (cf. George A. Kennedy, "The Monosyllabic Myth," Selected Works of George A. Kennedy, edited by Tien-yi Li [New Haven, 1964],

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pp. 104-107). In his popular exposition of sinology, Sound and Symbol in Chinese, Bernhard Karlgren says, "On the one hand, Chinese is monosyllabic, on the other hand, it is isolating . . ." ([London, 1923], p. 20). F. K. Li, in the Chinese Year Book for 1936-37, is satisfied with the cautious statement that one of the characteristics of Chinese, in common with other members of the Sino-Tibetan family, "is a tendency towards monosyllabicism" (cf. Kennedy, p. 107). One of the strongest arguments against such a theory of monosyllabicism was stated by George A. Kennedy. He, using an analysis of H. C. Chen's work on the model of the Thorndike word-counts, found that occurrences of the two syllables "le" and "de" alone comprised five per cent of the total count. Twelve such syllables, including the two mentioned, comprised twelve per cent of the total. Further study led him to the conclusion that at least sixty-three per cent of the vocabulary of Chinese is in polysyllabic form (cf. Kennedy, pp. 112-113). Along this line, Denzel Carr discovered, from a statistical analysis of various kinds of materials, that speech of an extremely colloquial style is no less than forty per cent polysyllabic. The closest thing to speech of a more serious and elevated nature, the modern written style, is estimated to be only thirty per cent monosyllabic as against more than fifty per cent for comparable material in English. The drift of the Chinese language toward greater polysyllabicity is seen even more clearly in the fact that not more than fifteen per cent of the Chinese equivalents of foreign technical terms consist of only one syllable (cf. "The Polysyllabicity of the Modern Chinese 'National Language,'" Rocznik Orjentalistyczny, X [1934], pp. 66-70). The most sound discussion of this controversy is John De Francis's "The Monosyllabic Myth," in which he indicates: "There can be no other conclusion. If linguistic dogma is replaced by linguistic science, the monosyllabic myth must inevitably give way before the polysyllabic reality of Chinese speech" (cf. Nationalism and Language Reform in China [Princeton, 1950], pp. 147-165).

"lack" or "little," *bu* (1st, 2nd, or 4th tone) "not," *liau* (3rd tone) "to finish." Their prosodic features have already been mentioned. For the latter polysyllabic units, a term *ci* (2nd tone) is generally used. Examples of such *ci* are *riteu* (here *teu* becomes a neutral tone), which means "sun," *shaubuliau* (in this combination, *bu* becomes a neutral tone and *liau* is 3rd tone), which means "unable to do without." The prosodic features of these polysyllabic units will be discussed below. These two kinds of morphological units, in general, are the constituents of everyday Chinese speech.[29]

3.211 The Patterns of Polysyllabic Units

There are four kinds of polysyllabic units commonly occurring in the flow of speech: namely, disyllabic units which are composed of two monosyllabic words; trisyllabic units composed of three monosyllabic words, and four-syllable units composed of four monosyllabic words. Examples of such polysyllabic units are as follows:

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[29] Chao indicates that there are two kinds of word-like subunits in speech, namely, free words as in *ren* (2nd tone) "man" and bound words as in *jinnian* "this year" formed by two monosyllabic words: *jin* (1st tone) "this" and *nian* (2nd tone) "year" (cf. pp. 33-34). Francis also concludes that the syllables of Chinese and English can be classified into three groups, namely, bound syllables, semi-bound syllables, and free syllables. These terms may be illustrated from both languages as follows: bound: *shan*- "cor-" as in *shanhu* "coral"; semi-bound: *shi*- "lith-" as in *shiyin* "lithography"; free: *pau* "gun" (cf. p. 149). The author, for the sake of comparison, based on the analysis of syllable structure, simply divides Chinese syllables into two categories: monosyllabic words and polysyllabic units including complex words, compound words and even phrases.

TABLE XXXVI

THE PATTERNS OF POLYSYLLABIC UNITS

disyllabic unit	/fəiji/ "aeroplane," /jintian/ "today"
trisyllabic unit	/həzuəshə/ "co-operative store"
4 syllable unit	/xinwənjizhə/ "journalist"
5 syllable unit	/shuəbuchulaidə/ "It's hard to say"

3.212 The Prosodic Features of Polysyllabic Units

3.2121 Tone sandhi variations

It has been said that every monosyllabic word in Chinese has its constituent tone. However, such a tone often tends to change its actual value when it is spoken in a succession of words. Linguists call such a phenomenon "tone sandhi variation." The most complex of such variation is what happens to the third tone. The following rules cover most of the common cases involving all tones:

a. When the disyllabic units are composed of a syllable (word) of the 3rd tone which is closely followed by a syllable (word) of the 1st, 2nd, 4th or neutral tone, the 3rd-tone syllable is pronounced with only a falling pitch without its final rise. That is, its pitch level becomes /21/ (˨˩)

instead of /214/ (˨˩˦). It is called "half 3rd tone." The following disyllabic units are examples.[30]

/xiaushuə/ [3⁀1] (˨˩˦ ˥) —> [½3⁀1] (˨˩ ˥), "novel"
/zuguə/ [3⁀2] (˨˩˦ ˧˥) —> [½3⁀2] (˨˩ ˧˥), "fatherland"
/qingzuə/ [3⁀4] (˨˩˦ ˥˩) —> [½3⁀4] (˨˩ ˥˩), "please, sit down"

/xihuan/ [3⁀0] (˨˩˦ °|) —> [½3⁀0] (˨˩ °|), "like"

b. When the disyllabic units are composed of two 3rd tones, the first becomes a second tone. That is, its pitch level becomes /35/ (˧˥) instead of /214/ (˨˩˦), although it is marked in the third tone in writing. Thus,

/hauleng/ [3⁀3] (˨˩˦ ˨˩˦) —> [2⁀3] (˧˥ ˨˩˦), "how cold"

However, when a third tone is followed by another third tone which has become a neutral tone in a complex word, the first tone is pronounced sometimes in the second tone and sometimes in the half-third tone. The examples are as follows:

/izi/ [3⁀0] (˨˩˦ °|) —> [2⁀0] (˧˥ °|), "chair"
/jiəjiə/ [3⁀0] (˨˩˦ °|) —> [½3⁀0] (˨˩ °|), "elder sister"

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[30] Since numbers are traditionally used by linguists to designate both the tones of Chinese and prosodic pitch level, a notational problem arises. Numbers will still be used for both in the present study also, but the tone designations will be placed in square brackets, with the concatenation sign joining the tone designations for the parts of complex words. The graphs in parentheses are explained in Table XXII on p. 2 , Chapter II. Neutral tone is indicated by a zero.

In addition, when the disyllabic units are composed of two 4th tones, the first does not fall quite to the bottom, but only to the middle. Its pitch level becomes /53/ (˥˧) instead of /51/ (˥˩). Thus,

/zaijian/ [4⁀4] (˥˩ ˥˩) —> [½4⁀4] (˥˧ ˥˩), "goodbye"

/uansui/ [4⁀4] (˥˩ ˥˩) —> [½4⁀4] (˥˧ ˥˩), "long live"

The change of tones also occurs in trisyllabic units. Two rules are worth pointing out:[31]

a. If the first syllable of a trisyllabic unit is a 1st or 2nd tone, the second syllable is a 2nd tone, and the third syllable is any except the neutral tone, then the second syllable is pronounced with the 1st tone. Thus,

/dungnanfəng/ [1⁀2⁀1] (˥ ˧˥ ˥) —> [1⁀1⁀1] (˥ ˥ ˥), "southeast wind"

All the possible changes of such trisyllabic units are as follows:

[1⁀2⁀1] —> [1⁀1⁀1], [2⁀2⁀1] —> [2⁀1⁀1]

[1⁀2⁀2] —> [1⁀1⁀2], [2⁀2⁀2] —> [2⁀1⁀2]

[1⁀2⁀3] —> [1⁀1⁀3], [2⁀2⁀3] —> [2⁀1⁀3]

[1⁀2⁀4] —> [1⁀1⁀4], [2⁀2⁀4] —> [2⁀1⁀4]

b. When a trisyllabic unit is composed of two 3rd tones or two 4th tones in adjacent syllables, the rules of tone sandhi are as follows:

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[31] Cf. Chao, p. 26 and pp. 108-113.

/hanshubiau/ [2⁀3⁀3] (˧˥ ˨˩˦ ˨˩˦) —> [2⁀2⁀3] (˧˥ ˧˥ ˨˩˦), "thermometer"

applying rule "a" above, then, it becomes [2⁀1⁀3] (˧˥ ˥ ˨˩˦). An example of two 4th tones is

/shuangguahau/ [1⁀4⁀4] (˥ ˥˩ ˥˩) —> [1⁀½4⁀4] (˥ ˥˧ ˥˩), "to register with return receipt."

In the cases where all syllables of a trisyllabic unit are the 3rd tone or the 4th tone, the rule applies as follows:

/uəiəiəu/ [3⁀3⁀3] (˨˩˦ ˨˩˦ ˨˩˦) —> [2⁀2⁀3] (˧˥ ˧˥ ˨˩˦) —> [2⁀1⁀3] (˧˥ ˥ ˨˩), "I also have." Or

/dagaihuəi/ [4⁀4⁀4] (˥˩ ˥˩ ˥˩) —> [½4⁀½4⁀4] (˥˧ ˥˧ ˥˩), "probably would."

3.2122 The neutral tone

As pointed out earlier, there are four different tones normally occurring in each stressed syllable (word). However, a number of syllables in actual speech do not always receive strong stress; they are more often unstressed, in which case they lose their original tone, changing their pitch levels and becoming weak and short, thus taking on the so-called "neutral tone," or "light tone."[32] Such changes in pitch vary and are all determined by the tone of the syllable preceding them. The following general rules show these tone sandhi variations in disyllabic units:

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[32] Most Chinese scholars prefer the term "light tone."

a. After the first tone, the neutral tone is pronounced with the mid-low pitch, namely, 2nd degree:

/tadə [1͡0] (˥ ·|), "his"

b. After the second tone, the neutral tone is pronounced with middle pitch, namely, 3rd degree:

/shəidə/ [2͡0] (˧˥ ·|), "whose"

c. After the third tone, it is pronounced with the mid-high pitch, that is, 4th degree:

/nidə/ [3͡0] (˨˩˦ ·|), "your"

d. After the fourth tone, it is a low pitch, 1st degree:

/dadə/ [4͡0] (˥˩ ·|), "big one"

Some changes in the pitch of the neutral tone in trisyllabic units are as follows:[33]

[1͡0͡4] changes from mid-low to mid-high or high
[2͡0͡4] changes from middle to mid-high or high
[3͡0͡1] changes from mid-high to mid-low
[3͡0͡2] changes from mid-high to mid-low.

In the relatively infrequent cases where the neutral tone begins a phrase, its pitch is usually about middle level.

3.2123 Stress

It is quite clear that the neutral tone contrasts with the four other tones in Chinese speech since the former is for unstressed syllables and the latter is for stressed syllables. Such contrast is most easily seen in disyllabic units, and forms the two different patterns of stress. The examples are as follows:

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[33] Cf. Chao, p. 108.

1. /shətəu/ a. [2⁀2] means "snake's head."
   b. [2⁀0] means "tongue."
2. /xazi/ a. [1⁀3] means "shrimp."
   b. [1⁀0] means "blind."

The second syllable of 1a and 2a above, in general, is always more heavily stressed than the first, whereas the second syllable of 1b and 2b is unstressed or weakly stressed. Thus, 1a and 2a have the stress pattern /ˋ̲ˊ̲/, and 1b and 2b have /ˊ̲ˇ̲/. The former pattern normally occurs in any disyllabic unit which is composed of two of the four stressed tones, such as /zaijian/ [½4 4], "good-bye"; /zazhi/ [2 4], "magazine"; /qianbi/ [1 3], "pencil." The latter pattern always occurs in any disyllabic combination which has a tonic stress on the first syllable, followed by a syllable with neutral tone:

/duəshau/ [1⁀0], "how many?" or "how much?"
/pəngiəu/ [2⁀0], "friend,"
/difang/ [4⁀0], "place."

Several investigations show that all three degrees of stress appear in trisyllabic, 4 syllable and 5 syllable units,[34] and form the following basic stress patterns:

TABLE XXXVII

STRESS PATTERNS OF THE TRISYLLABIC UNITS

Stress Pattern	Examples	Tone Contour	English Equivalent
a. M+M+P /ˋˋˊ/	/zixingchə/	[4⁀2⁀1]	"bicycle"
	/tushuguan/	[2⁀1⁀3]	"library"
	/uxiandian/	[3⁀4⁀4]	"radio"
b. M+W+P /ˋ˘ˊ/	/chabuduə/	[4⁀0⁀1]	"more or less, almost"
	/duibuqi/	[4⁀0⁀3]	"excuse me"
	/zənməban/	[3⁀0⁀4]	"what is to be done"
c. M+P+W /ˋˊ˘/	/uəishənmə/	[4⁀2⁀0]	"for what, why"
	/iəuisi/	[3⁀4⁀0]	"interesting"
	/məiguanxi/	[2⁀1⁀0]	"never mind," or "it doesn't matter"
	/hauhaudə/	[3⁀1⁀0]	"be good"

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[34] In his article "Disyllabic Stress Patterns in Peking Dialect," Pavel Kratochvil points out that there is another type of disyllabic unit which is composed of two syllables that are both unstressed. The example he gives is *dung xi* [2 2] "east and west." However, in his footnote, he also indicates that this type of disyllabic construction has not been set up only on the basis of a single case (cf. *Archiv Orientalni*, XXXII [1964], 401) The author treats *dung xi* *east, west* as two monosyllabic words, both of which have moderate stress with a syllabic separator between them. On the other hand, the polysyllabic unit *dungxi* [2 0] has a stress pattern of /ˊ˘/. It has a close juncture and belongs to the second pattern discussed above.

TABLE XXXVIII

STRESS PATTERNS OF FOUR SYLLABLE UNITS

Stress Pattern	Examples	Tone Contour	English Equivalent
a. M+M+M+P /ˋˋˋˊ/	/baihuədaləu/	[3⌒½4⌒4⌒2]	"department store"
	/bəipingdaxuə/	[3⌒2⌒4⌒2]	"Peiping University"
b. M+M+P+W /ˋˋˊ˘/	/tushuguanli/	[2⌒1⌒3⌒0]	"in the library"
c. M+W+M+P /ˋ˘ˋˊ/	/bangjungtəu/	[4⌒0⌒1⌒2]	"half an hour"
d. M+W+W+P /ˋ˘˘ˊ/	/ganganjingjing/	[1⌒0⌒0⌒4]	"clean and clean"

TABLE XXIX

STRESS PATTERNS OF FIVE SYLLABLE UNITS

Stress Pattern	Examples	Tone Contour
a. M+M+P+W+W /ˋˋˊ˘˘/	/həzuəshəlidə/ "the co-operative store's"	[2⌒4⌒4⌒0⌒0]
b. M+W+M+P+W /ˋ˘ˋˊ˘/	/shuəbuchulaidə/ "It's hard to say"	[1⌒0⌒1⌒2⌒0]
c. M+W+P+W+W /ˋ˘ˊ˘˘/	/lianggəlianggədə/ "counting the number by two by two"	[3⌒0⌒3⌒0⌒0]
d. M+M+M+P+W /ˋˋˋˊ˘/	/ijiəuliuqinian/ "the year of 1967"	[1⌒3⌒4⌒1⌒0]

3.22 The Prosodic Features of Speech

3.221 Sentence stress

It is generally held that in the Chinese sentence, as in the polysyllabic units, there are no more than three although a fourth degree of stress, called "extra-loud" stress, is recognized by Hockett.[35] There are:

Primary stress /ˊ/
Mid stress /ˋ/
Weak stress /˘/

Linguists indicate that the location of sentence stress is not predictable,[36] but it often tends to appear on the last syllable receiving primary stress in the utterance, with each preceding syllable of an utterance receiving slightly less stress.[37] When the last syllable is a particle or particle-like element with neutral tone, the stress falls on the penultimate syllable. Examples may be given as follows:

a. /zhə̀i bùshi shú/ "This is not a book."
b. /nə̀ig xuə̀shəng hə̀n háu/ "That student is very good."
c. /tà qìdianbán qù/ "He will go at seven thirty."
d. /nì zài náər/ "Where are you?"

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[35] This extra loud stress is merely a raised primary stress for emphasis. Hockett himself also points out that such a stress is contrastive and thus may be eliminated as a separate stress-level (cf. Peiping, p. 256).

[36] Hockett calls such sentence stress "nuclear stress," which is recognized as phonemically distinct from loud stress [primary stress] (cf. Peiping, p. 256).

[37] Cf. Chao, p. 26, and Hockett, Peiping, p. 256.

3.222 Juncture

3.2221 Syllabic separator

As mentioned earlier at least sixty per cent of the vocabulary of Chinese is in polysyllabic form (cf. p. 140, fn. 28) Such polysyllabic units in everyday speech, most of time, have a close transition between their syllables, and tend to be bound together to convey the specific meanings in the utterances. That is, they have the so-called "close juncture." However, when monosyllabic words in free form are spoken individually in the flow of speech, they have the syllabic separators or open juncture between them. The following examples indicate the contrastive feature between the close and open junctures.[38]

1a. /bufən+*dungxi*/, "One cannot distinguish one thing from another."

(*dungxi* means "things," in the sense of object, article.)

b. /bufən+*dung*+*xi*/, "One cannot tell east from west."

(*dung* *xi* means "east, west.")

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[38] Syllabic tone is closely related to stress pattern; both have an effect on the transition of syllables. In the example of /*dungxi*/ "thing," the second syllable is a neutral tone, which is short and light. However, in /*dung* *xi*/ "east, west," both tones are pronounced, receiving a moderate stress. Since /*xi*/ is the last syllable of the utterance, it receives the primary stress. The transcriptions of /*xingli* [2͡0] /`˘/ "baggage" and /*xing* *li* [2͡3] /`´/ "to salute" given by Hockett are good examples of the interrelation among such prosodic features (cf. Hockett, *Progressive*, p. 52).

2a. /lingxiu+hənhau/, "The leader is very good."
(lingxiu means "leader.")

b. /ling+xiu+hənhau/, "The collar and sleeves are very good."
(ling xiu means "collar, sleeves.")

3a. /zuəiəushəu/, "Very close and helpful assistant."
(zuəiəu means "very close.")

b. /zuə+iəu+shəu/, "Left and right hand."
(zuə iəu means "left, right.")

4a. /uədə+shəuzu/, "My brothers and sisters."
(shəuzu means "brothers and sisters.")

b. /uədə+shəu+zu/, "My hands and feet."
(shəu zu means "hand, foot.")

3.2222 Terminals

As in English there also are three terminal junctures in Chinese. The following very popular pun illustrates the change of meanings when these terminal junctures fall in different places.

a. /xiaiutian+iəukətian —> liurenbu ↑ liu ↓/

"It is raining (outside) and I have a visitor. Should I let him stay? Yes, I should."

b. /xiaiutian+iəukə ↓ tianliu —> renbuliu ↓/

"One day when I had a visitor it was raining heavily. But I didn't want him to stay no matter how heavily it rained."

The falling, rising, and sustained terminals occur in the first utterance; but only the fall and sustained appear in the second utterance. The open junctures also appear in different places in the sentences.

3.223 Pitch and Intonation

In addition to the syllabic pitch (tone) of Mandarin Chinese, undoubtedly there must be the rises and falls of pitch which constitute intonation contour in the utterances. But the analysis of these features is as yet incomplete. According to Hockett's analysis, three levels of pitch may phonemically be established in normal speech.[39] However, in some cases, for very special emphasis, the extra high pitch level can also occur. Thus the system of four levels of pitch used in the analysis of English may easily be applied to Mandarin Chinese.

As for the intonation contour of Mandarin, the contrast between the end of certain types of questions such as the yes and no questions and the end of a statement is clearly recognizable. The former always have a rising terminal at the end, forming a pitch contour /2 3 3 ↑/, whereas the latter has a fall in pitch at the end, forming a pitch contour of /2 3 1 ↓/. Examples are given as follows:[40]

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[39] Hockett, based on a private conversation with George A. Kennedy, indicates that the most typical register-contour intonation is found in utterances of at least four or five macrosegments' polysyllabic units: wide at first, narrower and with a lower pitch in the interior syllables, and wider again but still somewhat lower than at the beginning in the terminal macrosegment. A third intonation consists of a squeezing of the pitch-range into a narrow band at the median level throughout the utterance (cf. Peiping, pp. 255-256).

Questions with /2 3 3 ↑/	Statements with /2 3 1 ↓/
a. /ta dau tushuguan qu mə/ Is he going to the library?	a. /ta dau tushuguanqu/ He is going to the library.
b. /ta shi shəi/ Who is he?	b. /ta shi xianshəng/ He is the teacher.
c. /zhəizhi qianbi duanmə/ Is this pencil short?	c. /zhəizhi qianbi duan/ This pencil is the short one.
d. /zhəi shi shənmə/ What is this?	d. /zhəi shi zazhi/ This is a magazine.
e. /zhəibən shu hau bu hau/ Isn't this book good?	e. /zhəibən shu bu hau/ This book is not good.
f. /ta shi bu shi xuəshəng/ Isn't he a student?	f. /shi ta shi xuəshəng/ Yes, he is a student.
g. /bənzi duəshau qian/ How much is the notebook?	g. /liangmau qian/ Twenty cents.

The contrast between the intonation contour ending with sustained terminal and the statement contour is also recognizable. The former has a pitch contour of /2 3 2 →/, the latter, as mentioned above, /2 3 1 ↓/. Examples are as follows:

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[40] Hockett has done a comparative study of intonation contours in both languages and indicates that in Chinese the terminal pitch is higher for the question than for the statement (cf. *Progressive*, pp. 54-57). Yao Shen also points out that, in addition to "the drooping pattern" of the statement intonation in Mandarin Chinese, there are two kinds of "*mə*-questions": one has the drooping patterns; the other, a rising pattern (cf. "Some pitch pattern correlation between Mandarin and English," *Studies in Linguistics*, XVII [Buffalo, 1963], pp. 79-84).

Intonation Contour: /2 3 2 —> 2 3 1 ↓/

a. /zhəibən huabau bu xin —> nəibən xin ↓/
This illustrated magazine isn't new, that one is new.

b. /ta hui shuə zhunguən —> iəuhui shuə inguən ↓/
He can speak Chinese, and English also.

3.3 Contrastive Analysis of the Prosodic Features of Both Languages

3.31 The Difference Between the Polysyllabic Structures of Both Languages

It is easily seen, from the discussion of polysyllabic structures of both languages, that English has a much greater variety of polysyllabic structures than Mandarin Chinese. The former has seven different patterns ranging from two syllables to eight syllables with the minimum number of one stress pattern to the maximum number of eight patterns, whereas the latter has four common patterns with combinations ranging from two syllables to five, with no more than four stress patterns. However, the polysyllabic structures of both languages are basically different from each other. The former is simply a close-knit word no matter how many syllables it contains, while the latter is a combination of monosyllabic words. Some of these combinations, like compounds words in English, are composed of two or more free words as one morphological unit. Examples are as follows:

Polysyllabic Unit	Monosyllabic Words	English Equivalent
/nuan fang/ [3⁀2]	"warm," "house"	greenhouse
/xianiuan/ [4⁀3]	"school," "garden"	campus
/cingnian/ [1⁀2]	"green," "year"	youth
/qunzhung/ [2⁀4]	"group," "multitude"	masses
/tushuguan/ [2⁀1⁀3]	"pictures," "books," "hall"	library
/uxiandian/ [2⁀3⁀3]	"non," "wire," "electric"	radio
/baihuədaləu/ [3⁀4⁀4⁀2]	"hundred," "goods," "big"; "a house with more than one story"	department store

Some of them, similar to English complex words, consist in the formation of a base morpheme plus certain particles or suffixes. Examples may be given as follows:

Monosyllabic Word	Polysyllabic Unit	English Equivalent
a. lə [1]: (to indicate the aspect of a completion of action)		
/dung/ "to understand" /lə/	/dunglə/ [3⁀0]	(I) have understood (it).
b. də [1]: (a structural particle to be used as adjective modifier)		
/jiu/ "old" /də/	/jiudə/ [4⁀0]	(It's) old.
c. zi [4]: (a noun particle)		
/bəi/ "cup" /zi/	/bəizi/ [1⁀0]	cup.

Since the polysyllabic structure of Mandarin is not like the close-knit words such as "history" /hístrI/, "frequence" /fríkwəns/ and "many" /mɛ́nI/ in English, but fundamentally a group of monosyllabic words, each syllable, following the nature of monosyllabic words spoken in isolation, often receives moderate stress. Consequently, the stress patterns of the two languages are different. In general, most English polysyllabic words have a "fore-stress" tendency, combining with more unstressed (weakly stressed) syllables, whereas there is "end-stress" with the other syllables less weakly in Mandarin. In addition, although both languages have the system of three degrees of stress for polysyllabic words (units), the range of stress on the polysyllabic structures is also a little different. Roughly speaking, English has a wider stress range than Mandarin since most polysyllabic words in English hold both primary and weak stress as a contrastive feature in each word, while in Mandarin the stress range is mostly just the difference between primary and mid stress, except for the units formed with the suffixes and particles that are always unstressed with the neutral tone. Examples may be given as follows:

The Stress Range of English Polysyllables	The Stress Range of Mandarin Polysyllables	
History /hɪ́strɪ̆/	/lìshí/	[4͡3]
Frequence /fríkwə̆ns/	/cìshú/	[4͡4] → [½4 4]
Many /mɛ́nɪ̆/	/xùdúə/	[3͡2]
Impression /ɪmprɛ́šən/	/ínxiăng/	[4͡0]

3.32 Stress-timed Rhythm Versus Syllable-timed Rhythm

It is obvious that the nature of stress of either monosyllabic words or polysyllabic words (or units) is very closely associated with sentence stress. The value of these syllabic inherent stresses is often modified under the interwoven functions of intonation, timing and sentence stress in connected speech. Such modifications are quite different in each language. The distinguishing feature between the timing and stressing of the sentence of both languages is a most important one. As pointed out above, there is a great deal more contrast between stressed and unstressed syllables in English than in Mandarin; this is as true of sentence-stress as of word-stress. In English speech, the unstressed syllables are so unimportant, rhythmically speaking, that it is often difficult to distinguish them. Conversely, the stressed syllables always tend to predominate the whole utterance and recur at regular intervals. Consequently, the timing of stressed syllables in a sentence comes at somewhat evenly spaced intervals, and any unstressed syllables falling in between the stressed ones are simply fitted in with greater or less speeding up as may be necessary; thus, the more unstressed syllables there are between stressed syllables, the more rapidly and indistinctly they are pronounced. Such a type of rhythm is known as stress-timed. On the contrary, the normal speech of Mandarin, due to the nature of monosyllabic structure, often tends to have a syllable-timed rhythm. The rate of utterance of a succession of syllables, most of the time, remains approximately the same no matter how many stresses there are or where they fall in the stream of speech. The timing of an utterance is simply determined by the number of syllables, stressed and unstressed being almost equally strong, except that a few words with neutral tone in certain combinations spoken in the very fast speed--often become shortened and weaker than usual, such as

a. /tamən/ [1⁀0] "they," "them" → /tam/, as in
/tàm láilə ↓/ [1⁀0⁀2⁀0], "They have come."
b. /shəma/ [2⁀0] "what?" → /shəm/, as in
/shə̀m rén ↑/ [2⁀0⁀2], "Who is it?"
c. /dəufu/ [4⁀0] "beancurd" → /dəuf/, as in
/də̀uftáng/ [4⁀0⁀1], "beancurd soup"

3.33 Single Pitch Contour Versus Dual Pitch Contour

In contrasting the intonation of both languages, little discussion is necessary for the terminal junctures because both have the same three kinds of terminals. However, so far as the pitch feature is concerned, there is a great difference between the two languages. Generally speaking, pitch exists with every sentence, every word, and every syllable of human speech. Even a sound in isolation is produced by vibrations whose frequencies constitute its pitch. In addition, there is no language which can be uttered in a pure monotone; varying the pitch to differentiate the meanings of utterances occurs in all human language. However, such variations in pitch in human languages are not all alike. Though both Mandarin and English have the same system of four relative pitch-levels which constitute all kinds of intonation contours of everyday speech, Mandarin has two kinds of pitch contours: syllabic pitch for individual syllables and intonational pitch for longer utterances or sentences, whereas English only holds the latter feature of pitch. As indicated earlier, there are five different contours of syllabic pitch which make a difference in meaning of the syllables. Such syllabic pitch contours are closely related to the rise and fall of the whole register of the voice (intonation contour). The phenomenon of tone sandhi variations mentioned earlier is the most important feature of such relations. On the other hand, English has no such syllabic pitches. The English sequences of pitches over longer stretches have a fundamentally different function from that of pitch on individual syllables of Mandarin speech. In one respect the intonation contours of both languages are similar--they do not make any difference in the "dictionary meaning" of an utterance; the three most commonly used intonation contours of both languages just tell the hearer something concerning the emotional attitude of the speaker or the apparent purpose of making the utterance.

CHAPTER IV

THE APPLICATION OF THE ANALYSIS TO LANGUAGE TEACHING

4.1 Teaching Syllabic Phonemes

4.11 Overcoming Problems with Syllabic Phonemes

Based on the contrastive analysis of syllabic and prosodic features of both languages described in the previous chapters, the application of the generalizations and observations induced from the analysis to language teaching will be the main concern of this chapter. The first subject dealt with here is the teaching of English syllabic phonemes. Most psycholinguists and language teachers make the point that the most important and economical approach in teaching a foreign language is to understand fully the similarities and differences between the native and target languages, and then to try to overcome the learning interferences or conflicts between them; accordingly, it seems that the best way is, first, to give more attention to the blind spots which the learners of a foreign language do not easily perceive because there are no such phenomena in their native language; second, troublesome contrasts are described and finally the methods and rules which language teachers should apply in the learning process must be determined.

A review of the syllabic phonemes of both languages shows that there are two major contrastive features which cause Chinese speakers the most difficulty in learning English, namely:

a. The phonemic contrast between tense and lax syllabics in English.

b. The articulatory contrast between the quadrilateral and triangular pattern used by the vowels.

As mentioned earlier, in English there is a series of syllabic phonemes in which the muscles of the tongue are tense, opposed to another series in which they are held lax The phonetic descriptions of such English syllabic phonemes are as in Table XL. Since there is no phonemic difference between the tense and the lax articulation in Mandarin syllabic phonemes, the contrast between both languages may be diagrammed as in Table XLI. Looking at this table, it is easy to understand why Mandarin speakers often mix the English syllabic phonemes /i/ with /I/, and substitute one phoneme for the other; the pronunciation of "reading" as /rIdlŋ/ instead of /ridlŋ/ is simply because these two phonemes /i/ and /I/ are allophones of the same phoneme in Mandarin. The similar common and serious mistakes are often made in the contrasts between /e/ and /ɛ/ and /u/ and /U/. It is not difficult for Mandarin speakers to distinguish the /o/ and /ɔ/ since there are two counterpart diphthongs

TABLE XL

PHONETIC DESCRIPTION OF ENGLISH SYLLABIC PHONEMES

Phonemic Symbol	Phonetic Description
Front Syllabics	
/i/	high-front-tense-long[1]
/I/	high-front-lax-short
/e/	mid-front-tense-long
/ɛ/	mid-front-lax-short
/æ/	low-front-lax
Back Syllabics	
/u/	high-back-tense-long
/U/	high-back-lax-short
/o/	mid-back-tense-long
/ɔ/	mid-back-lax-short
Central Syllabics	
/ə/	mid-central-lax
/a/	low-central-lax

//əu// and //au// in Mandarin, though both are phonetically different from those of English.[2] As to the three vowels without the tense-lax contrast, /æ/ is the most troublesome sound for Mandarin speakers. Phonemically, there is no /æ/ in Mandarin. However, since Mandarin does have //ə// and //a// which are much similar to English /ə/ and /a/, and both vary widely depending on environmental conditioning,[3]

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[1] Since the theory of long and short syllabics has been held by many scholars for many years, the author, for the comparative purpose, would adopt the terms in this study.

[2] Cf. Chapter II, pp. 83, 100.

[3] Cf. Chapter II, p. 100.

TABLE XLI

A COMPARISON OF ENGLISH TENSE-LAX SYLLABICS WITH MANDARIN SYLLABICS

English Contrast Phonemes	Mandarin Counterpart	
Front		
/i/	//i//[4]	
/I/		
/e/	//əi//[5]	
/ɛ/		
Back		
/u/	//u//	
/U/		
/o/	//Vu//	//əu//
/ɔ/		//au//
Noncontrast		
/æ/	none	
/ə/	//ə//	
/a/	//a//	

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[4] In order to distinguish the phonemes of the two systems, the Mandarin phonemes are enclosed in double slant lines, while single slant lines are used for English.

[5] /e/ is much like the diphthong //əi// in which //ə-// has value /ɛ/.

the Chinese speakers often use both to substitute for the English /æ/.

As pointed out above, another learning interference that causes Mandarin speakers a lot of trouble is the articulatory movement of the tongue, lips and jaw. For the five English front syllabic phonemes, the tongue position is gradually changed from high to low, the lips become less and less spread, and the jaw is also considerably dropped as each one is uttered. However, such movements are very difficult for Mandarin speakers to perform since they are accustomed to the triangular movement in which the tongue moves, most of the time, toward the high front position, the lips remain either fully spread, as for //i//, or rounded, as for //ü//, and the jaw drops very little or is unchanged.

4.12 Teaching Approaches

With an understanding of the differences between the two systems as described above, much more attention and emphasis should be given to the following two basic elements of training. First exercises using the minimal pairs should be stressed. In order to train Mandarin speakers to distinguish and produce the tense and lax contrasts, a large number of exercises on minimal pairs is absolutely essential and a specific description of each syllabic phoneme with more detail must be presented before giving the exercises. The following are examples of such descriptions with examples of minimal pairs.

4.121 /i/ vs. /I/

English /i/ is pronounced farthest to the front of the mouth with the jaw most nearly closed. Unlike //i//, which is steady in the high front position, the tongue for /i/ is glided upwards. The sides of the tongue are pressed tightly against the upper bicuspid (two-pointed) teeth and the palate. The tip may press the cutting edge of the lower front teeth. Upper and lower teeth almost touch. The lips are spread somewhat by muscular force. The air escapes through a very narrow opening between the tongue blade (the part just behind the tip) and the upper tooth ridge. /i/ is made with a great deal of tension and effort; the best way to make the necessary effort is to think of the sound as being written with a double symbol: ii. To change /i/ to /I/, the jaw relaxes and drops very slightly, the pressure of the tongue against the upper bicuspids decreases, and the forced spreading of the lips disappears. The tongue tip may merely touch the back of the lower front teeth. The opening between the tongue blade and the palate becomes wider and rounder.[6] The following minimal pairs can be used in drills on this contrast:[7]

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[6] The articulatory descriptions of the English vowels presented here depend very heavily on Prator (cf. pp. 92-108).

[7] The teacher should use examples from this exercise in clearly demonstrating the sounds before having the students

/i/	/I/	/i/	/I/
deep	dip	neat	knit
eat	it	peel	pill
feel	fill	peat	pit
feet	fit	read	rid
heal	hill	seat	sit
heat	hit	seen	sin
keep	kip	sheep	ship
lead	lid	steal	still
leave	live	peak	pick
least	list	dean	din

4.122 /e/ vs. /ɛ/

Generally speaking, English /e/, like //əi//, is pronounced as a slight diphthong. For /e/, the jaw drops just a little more than for /I/. The tongue tip may touch the bottom of the front teeth without pressure. The sides of the tongue press slightly against the sides of the upper bicuspids. The passage through which the air escapes between the middle of the tongue and the palate grows wider, and there is enough pressure to narrow the air passage somewhat. The lips are open. /ɛ/, unlike /e/, is not usually diphthongized. To form /ɛ/, the jaw is once more lowered just a little. The tongue exerts no pressure at all; the tip may touch the spot where the lower front teeth join the tooth ridge, the sides touch lightly the tips of the upper bicuspids. The air-escape passage is as wide as the roof of the mouth itself. The following minimal pairs can be

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attempt to do the exercise. This is true for all of the exercises in this chapter.

used in drills on this contrast:

/e/	/ɛ/	/e/	/ɛ/
bait	bet	lace	less
bake	beck	late	let
date	debt	mate	met
fade	fed	nail	Nell
hail	hell	pate	pet
laid	led	raid	red
		shale	shell

4.123 /u/ vs. /U/

It is worth pointing out that English front contrasts are largely determined by the tongue; that is, by the shape and size of the air-escape passage between the tongue and roof of the mouth. On the other hand, the back contrasts are mostly influenced by the lips, namely, by the size and shape of opening between them. /u/ has the most rounding and protrusion of all the English syllabics. The lips should be rounded and protruded more than for the high back Chinese syllabic, leaving a little circular opening about the size of a pencil. The teeth are not visible. Unlike //u//, which is steady from beginning to end, for /u/ the tip of the tongue is drawn quite far back and touches nothing, but the sides of the tongue press firmly for some distance along the upper tooth ridge. /u/, like /i/, requires tension and effort for its production. Using the double symbol uu may help the learners get correct sound for this syllabic. To form U, the lips have much less rounding and protrusion than in the production of /u/. The opening is wider than for /u/, but a good bit smaller in distance from upper to lower lip. The teeth may be visible; the jaw is closed slightly. Though the tongue tip touches nothing, the tongue itself is pulled back and down, more than for /u/, until its sides touch the upper tooth ridge. Minimal pairs for drills may be given as follows:

/u/	/U/
fool	full
Luke	look
pool	pull
shoed	should
suit	soot

4.124 /o/ vs. /ɔ/

/o/, like //əu//, is frequently diphthongized. To produce /o/, the lips form just the shape of the letter _O_. This requires that they be protruded and rounded more than for /U/. The resulting opening is a little circle about half an inch in diameter. The jaw is raised, the "bunching" of the tongue in the back of the mouth is greater, and the muscles are tense. For /ɔ/, the opening is usually about one inch or less across, and half an inch from top to bottom. The lips are somewhat protruded. The jaw is higher than for /a/ but lower than for /o/. The tongue is "bunched" slightly more toward the back of the mouth. Normally little is to be seen of the teeth. The following minimal pairs using the contrast may be used in drills.

/o/	/ɔ/
boat	bought
coat	caught
dough	daw
flow	flaw
goal	gall
hole	hall
Joe	jaw
mow	maw
Poe	paw
row	raw
show	Shaw
so	saw

4.125 /æ/, /a/ and /ə/

Since there is phonemically no /æ/ in Mandarin and Chinese speakers very often mix /æ/ with /a/, the descriptions and drills for these syllabics become very important. As seen in Table XL, /æ/ is the lowest sound of the front vowels. To form it the jaw is lowered quite a bit, until the mouth is almost as wide open as it can be without making a muscular effort. For /æ/, the lightest possible contact is made between tongue tip and lower tooth ridge, and between sides of tongue and the tips of the upper bicuspids or even of the first molar teeth just behind the bicuspids. In other words, the passage through which the air escapes is as wide and deep as it can be and still remain a passage formed by the tongue rather than by the cheeks.

/a/ is the lowest sound of central vowels. To form it, the jaw is lowered so far as to require a slight muscular effort. As a consequence, the lips are also wide open, about an inch apart for most speakers, and two upper front teeth and several lower teeth are probably visible. The tongue tip lightly touches a point as low on the floor of the mouth as it can comfortably in a relaxed manner, so low that in compensation the back of the tongue must be raised just a little in the throat. The value of /ə/ is more definite than //ə// is. Linguists usually call it the central, neutral, relaxed, and "lazy" sound. The /ə/ is formed with the lips slightly parted over almost their entire length. There is no tension or effort anywhere. The tongue lies relaxed on the floor of the mouth, and usually neither its sides nor its tip touches anything. The minimal pairs for drills may be as follows:

/æ/	/a/	/ə/
back	bock	buck
bag	bog	bug
cat	cot	cut
cad	cod	cud
hat	hot	hut
jag	jog	jug
lack	lock	luck
rat	rot	rut

4.126 Quadrilateral vs. Triangular Pattern

The descriptions and drills of the contrasts presented above may give the learners a clear phonetic picture of each sound. However, in the stream of speech, due to the continuous occurrences of syllabic sounds, the tongue, lips and jaw often move toward and away from the proper position very rapidly. Since the quadrilateral movement described earlier is different from the triangular motion, the Mandarin speakers need much more training in the former articulatory exercise. The following drills are the approaches which may be helpful.

a. Pronounce a prolonged syllabic sound of each of the eleven phonemes several times at the beginning of each class.

b. Pronounce the five front and four back syllabic sounds in succession from high to low or from low to high.

c. Pronounce the eleven syllabics in succession from front to back.

4.2 Teaching Nonsyllabic Phonemes

4.21 Overcoming Problems with Nonsyllabic Phonemes

4.211 Voicing vs. Voicelessness

A review of the contrast between the nonsyllabic structures of English and Mandarin shows that there are several distinctive features which cause trouble for Mandarin speakers. The first important one of such features is in voicing or the lack of it. There are eight pairs of nonsyllabic phonemes which differ in such a manner, namely,

Voiced: /b d g ð v z ž ǰ/
Voiceless: /p t k θ f s ś č/

Since there is only one pair /sh, r/ in Mandarin which differ in voicing, and since most nonsyllabics of Mandarin contrast with each other in aspiration and nonaspiration, Mandarin speakers often neglect to make the voicing distinction between these eight pairs in English. Instead of vibration of the vocal cords, they tend to pronounce each voiced counterpart with less aspiration. Besides, as the following list shows, English has many more voiced nonsyllabics than Mandarin. On the other hand, Mandarin has many more voiceless nonsyllabics than English:

	English	Mandarin
Voiced	15	5
Voiceless	9	17

Therefore, training Mandarin speakers to make a correct articulatory contrast between voicing and voicelessness is the first lesson of learning English nonsyllabics. There are various ways of testing whether a sound is voiced or voiceless. The following suggestions may be used by the students in their class.

A. In a voiced sound, one may feel the vibration of the vocal cords by putting his fingers on his Adam's apple, or larynx.

B. If one puts his hands over his ears a voiced sound causes a buzzing sensation in his head.

4.212 The Aspiration of Nonsyllabic Sounds

The contrast between voicing and voicelessness is not the only difference of nonsyllabic sounds. Many of them, like the stops, are frequently pronounced so rapidly that it is very difficult for the foreigner to tell whether the vocal cords are vibrating or not. However, there is a contrast which is much easier to distinguish, that is, the secondary feature of aspiration, which is much like the same phenomenon in some Mandarin nonsyllabics. In general, there is a principle in English which shows that any nonsyllabic sound occurring in initial position of a syllable is pronounced either with a puff of air (aspirated) or with vibration of vocal cords. The former are always voiceless sounds; the latter, their voiced counterparts. There is little difficulty for Mandarin speakers to aspirate the voiceless counterpart since this feature also occurs in Mandarin Chinese. However, in English, twenty-one nonsyllabics, with the exception of the voiceless glottal fricative /h/ and the semivowels /y, w/, may occur in the final position whereas only two /n, ŋ/ of twenty-two nonsyllabics can appear finally in Mandarin. This frequent occurrence of final nonsyllabics in the syllable structure of English often causes Mandarin speakers a little trouble, especially aspiration at the final position.

The aspiration which helps distinguish the initial voiceless nonsyllabics from the voiced counterparts just mentioned above, is not typical of all voiceless nonsyllabics in the final position. Usually such a feature only occurs with final voiceless continuants: [f] [s] [š] [θ], not with final voiceless stops: [k], [p] and [t], because they are either not released or not very strongly articulated. Therefore, there is another principle which language teachers must keep in mind; that is, only voiceless continuants in the final position of the syllable are strongly aspirated. In American speech, there is a strong tendency to avoid heavy aspiration of final nonsyllabics other than voiceless continuants. To utter the stops at the end of a syllable, English speakers usually pronounce only the first half of a stop, making the closure, but allowing the voice to die before the release.[9] When English speakers say "A map," for example, the sound ends while the lips are still pressed together for the [p], and the lips may not open again for a moment. In saying "on your right," English speakers similarly avoid any "finishing sound" (the puff of air) after [t]. To Mandarin speakers this would mean that the final [p] or [t] would simply not be heard. A native speaker of English, however, comes by long practice to be able to distinguish between final stops merely by perceiving the influence of their closure on the preceding vowel. For Mandarin speakers, the pronunciation of such unreleased final voiceless stops is most difficult.

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[9] In general, two movements are necessary for the production of a stop such as [t], [k], or [p]. There is first a closure, or stopping of the outflow of air: for [t], the tongue tip presses against the alveolar ridge; for [k], the back of the tongue rises and presses against the soft palate; for [p], the lips are closed. As soon as a little pressure has been built up, comes the second movement, the release of the air: for [t] the tongue tip leaves the alveolar ridge; for [k], the back of the tongue falls away from the soft palate; for [p], the lips open. It is during this second movement that aspiration, the sound of escaping air, may be heard to a greater or lesser degree (cf. Prator, p. 75).

4.213 The Clusters of Nonsyllabic Phonemes

As learned earlier, English has many complex clusters of nonsyllabic phonemes in both initial and final position whereas Mandarin never permits clusters initially or finally. Thus, Mandarin speakers have a very hard time pronouncing English nonsyllabic clusters in both positions. They often tend to slow down the clustering nonsyllabic phonemes and are apt to insert a sort of [ə] sound in between the nonsyllabics of the cluster, thus making more syllables than the word should have. The word "ox" /aks/, for example, has only one syllable in English, but many Mandarin speakers pronounce it with two, i.e. /akəs/. Again, the monosyllabic word "clothes" /kloðz/ is pronounced as two syllables /kloðəz/ or even four syllables /kəloðəzə/ by the beginning Chinese student. The most difficult feature for Mandarin speakers is that many clusters occur as finals containing suffixes. The brief review of English clusters presented earlier shows that altogether there are 190 final clusters which occur in modern

American English. Of these, 61 occur at the ends of single-morpheme words, and 129 are formed by the adding of five bound inflectional morphemes /t, d, s, z, θ/.[10] This very prominent feature of final clusterings caused by the addition of these five suffixes causes a lot of trouble for Mandarin speakers. The following general principles should be carefully studied and frequently drilled.

4.2131 Pronunciation of -ed

The pronunciation of the ending -ed added to regular English verbs forming the past tense and past participle, is determined by a very simple phonetic principle. That is, when two nonsyllabics are pronounced together, it is difficult to voice one and leave the other voiceless, and easy to voice both or leave both voiceless. Thus, two rules are formed as follows:

a. Pronounce [-ed] as /d/ when it follows any voiced nonsyllabic except [d], and after all syllabic sounds, e.g. moved /muvd/, canned /kænd/, played /pled/.

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[10] The distribution of the 190 final clusters is: 50 two-nonsyllabic clusters without suffixes, 11 three-nonsyllabic clusters without suffixes, 44 two-nonsyllabic clusters with suffixes, 73 three-nonsyllabic clusters with suffixes and 12 four-nonsyllabic clusters with suffixes (cf. Chapter II, pp. 53-74. However, such an analysis is different from Fries'. He indicates that there are 151 post-vocalic consonant clusters which occur in present-day American English. Of these, 65 occur at the ends of single morpheme words, and 86 are formed by the adding of /t, d, s, z/. He does not count the /θ/ (cf. Fries, p. 18).

b. Pronounce [-ed] as /t/ when it follows any voiceless nonsyllabic except [t], e.g., *hoped* /hopt/, *passed* /pæst/, *laughed* /læft/.

When the final sound of a syllable ends in [d] or [t], it is almost impossible to add /d/ or /t/ without an intrusive syllabic sound. Since syllabics are voiced, the insertion of a syllabic sound between the two nonsyllabics will cause the final *d* to be pronounced as a voiced /d/ rather than voiceless /t/. Thus, the third rule must be observed as follows:

c. Pronounce [-ed] as /Id/, a separate syllable, when it follows [d] and [t], e.g., *protected* /prətɛktId/, *intended* /IntɛndId/.[11]

Many Mandarin speakers often fail to observe the above rules that cause the following common errors since such suffixes do not occur in Mandarin Chinese. Language teachers should be aware of possible errors and present the past tense morpheme in its three phonological shapes rather than misleading the students by referring to it as a single item. These are the common errors that will inevitably result from inadequate instruction:

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[11] There are several words which seem to be exceptions to the rule, but they are full adjectives rather than past participles:

A naked (/nekId/) child
The rugged (/rəgId/) rock
A wicked (/wIkId/) idea
A two-legged (/tulɛgId/) animal
An aged (/eǰId/) minister
A wretched (/rɛčId/) day

There are dialectal and idiolectal variations in the pronunciation of -*ed*; some people say /Id/ whereas others say /əd/. These pronunciations never contrast in any one person's speech and consequently it is difficult to decide which phoneme is the best to use in transcribing the syllabic. Since the principal guide for the present study (Kenyon and Knott, *A Pronouncing Dictionary*) transcribes the morpheme as /Id/, it seems to be the best one to use here also.

a. The pronunciation of -*ed* as a separate syllable after nonsyllabics other than [d] or [t], e.g., *robbed* as /rabId/ instead of /rabd/, *thanked* as /θæŋkId/ instead of /θæŋkt/.

b. To pronounce -*ed* as /It/ after voiceless sound, e.g., *stopped* as /stapIt/ instead of /stapt/.

c. Omission of the entire ending, e.g., *talked* as /tɔk/ instead of /tɔkt/, *raised* as /rez/ instead of /rezd/.

4.2132 Pronunciation of -*s*, -*es*, and -'*s*

In English, the addition of the suffix -*s*, -*es*, or -'*s* to the end of the syllable is another very important morphological rule to make a noun plural or possessive, or to put a verb in the third person singular form of the present tense. The pronunciation of these endings is determined by the same phonetic principles as those of the pronunciation of -*ed* Thus, there are also three rules of pronunciation which govern these morphophonemic changes, as follows:

a. To pronounce -*s* as /z/ when it follows any voiced nonsyllabic except [z] and [ž], and after all syllabic sounds, e.g., *reads*, *reads*, *Mr. Reed's* as /ridz/; *rows* (a boat), *rows* (of chairs), *Mr. Roe's* as /roz/; *(Mr. Love) loves*, *(the) loves (of Mr. Love)*, *Mr. Love's* as /ləvz/.

b. To pronounce -*s* as /s/ when it follows any voiceless nonsyllabic except [s] and [š], e.g., *chaps* (his lips), (cowboy) *chaps*, *the chap's* as /čæps/.

c. When these endings follow the sibilants [z] [s] [ž] or [š], they become [Iz] as a separate syllable, e.g. *houses* (verb or noun) or *houses'* /hauzIz/, *house's* /hausIz/; *foxes* (verb or noun) or *foxes'* /fakzIz/, *fox's* /faksIz/.

4.2133 Pronunciation of -*th*

The adding of -*th* to form ordinal numbers and abstract nouns is the most difficult suffix for Mandarin speakers since there is no such sound in Mandarin. More discussion and exercises on this feature will be presented in the next section of this chapter.

4.214 The Pronunciation of Syllabic Consonants

As pointed out earlier, there are five nonsyllabics: /m n ŋ l r/, which may assume the function of a vowel and act as an unstressed syllabic sound in English. These syllables are difficult for Mandarin speakers to pronounce. For instance, instead of the pronunciation of /lItl̩/ for *little*, of /wUdn̩t/ for *wouldn't*, /katn̩/ for *cotton*, /sədn̩/ for *sudden*, Mandarin speakers often tend to pronounce them as [lItəl], [wUdənt], [katən], and [sədən]. This insertion of [ə] between the two nonsyllabics in the second syllable is obviously an element of "foreign accent." Generally speaking, four nonsyllabics very commonly are involved in the production of syllabic consonants: [t], [d], [n], and [l]. What causes the formation of syllabic consonants is that these are all made with the tip of the tongue in the same position. In pronouncing sudden, for example, the tongue tip goes to the alveolar ridge to form [d], and just stays there to pronounce the following [n] There should not even be a brief separation of tongue and alveolar ridge between [t] and [n]. If the tongue tip breaks contact and moves from its fixed position for even a fraction of a second, the insertion of an [ə] between the two consonants will result. Therefore, in teaching Mandarin speakers, language teachers should be reminded of this phenomenon. Before a syllabic consonant, the closure for stops like /t/ or /d/ takes place normally, but the release is quite unusual, since the tongue tip, which normally makes the release by moving away from the alveolar ridge, must in this case remain in its position for the formation of the following syllabic consonant.[12] For example, before syllabic consonant [l] the release is made by a sudden lowering of the middle and sides (not the tip) of the tongue; this permits the air imprisoned by the preceding closure to rush out and make an [l]. Before syllabic consonant [n] the release is made by sudden opening of the velum, which allows the imprisoned air to escape through the nose.

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[12] It is to be understood that the syllabic consonant can occur only in an unstressed position. In words like lieutenant no syllabic consonant is formed because the syllabic nucleus following the /t/ is stressed.

4.22 Teaching Approaches

It has been pointed out that there are a number of phonological principles, rules, and distinguishing features of nonsyllabic phonemes occurring in English which either are different from or do not occur in Mandarin nonsyllabics. Language teachers must, first, demonstrate such phonetic peculiarities to the student with the explanation limited to what is necessary for the students' attention to be directed to the features in question. The practice drills, then, should be well developed. The following are sample drills which are especially important in learning the sounds that are most difficult for Chinese students.

4.221 Drills on the Features of Voicing vs. Voicelessness and Aspiration vs. Nonaspiration in Both Initial and Final Position[13]

4.2211 /f/ vs. /v/

Mandarin Chinese has the voiceless fricative /f/, but it does not have its voiced counterpart /v/. If one says something like the Mandarin /f/ but with voicing instead of aspiration, the correct pronunciation for /v/ will result. The following pairs of words can be used in drills:

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[13] Medial position is not considered here because the method being described concentrates on monosyllables. Later instruction on transitions between the syllables of polysyllabic words would be necessary for a complete instruction program.

Initial		Final	
(1) /f/	(2) /v/	(1) /f/	(2) /v/
fat	vat	belief	believe
fan	van	half	halve
few	view	leaf	leave
fear	veer	life	live
feel	veal	fife	five
file	vile	safe	save
fine	vine	serf	serve
fin	Venn	wife	wive

4.2212 /s/ vs. /z/

As in the case of /f/ vs. /v/, Mandarin Chinese has the voiceless fricative /s/ but not its voiced counterpart /z/. The English /s/ is made by placing the tip of the tongue on the alveolar ridge and letting the breath escape with a hissing sound through a groove down the center of the tongue. The Chinese /s/ is made with the tip of the tongue further forward than in English. /z/ is a voice /s/ but is unaspirated. The following pairs of words can be used in drills:

Initial		Final	
(1) /s/	(2) /z/	(1) /s/	(2) /z/
seal	zeal	bus	buzz
said	zed	face	phase
sing	zing	fuss	fuzz
sip	zip	cease	seize
Sue	zoo	ice	eyes
		piece	peas
		price	prize

4.2213 /θ/ vs. /ð/

Chinese speakers have a good many difficulties in pronouncing the English nonsyllabic sounds /θ/ and /ð/, because they are not found in Mandarin Chinese. /θ/ is a voiceless spirant. It is formed by putting the tongue immediately behind the teeth and allowing the breath to escape over the tongue with a noisy sound. /ð/ is the voiced equivalent of /θ/ but without aspiration. There are not many minimal pairs with these sounds, but the following near-minimal pairs could be used in drills:

Initial		Final	
/θ/	/ð/	/θ/	/ð/
thigh	thy	teeth	teethe
thin	then	bath	bathe
think	there	tooth	toothe
thing	this	breath	breathe
thank	that	sooth	soothe
thief	these	sheath	sheathe
thorn	those	loath	loathe
thought	though	wreath	wreathe
theme	them		

4.2214 /š/ vs. /ž/

Although there is an /š/ in Mandarin Chinese, as mentioned earlier its distinguishing feature is not the same as the one in English. The nonsyllabic sound /ž/ is not found in Chinese. In making an English /š/ the blade of the tongue is in approximately the same position as for the /š/ but the major muscular pressure is applied against the molar teeth rather than against the alveolar ridge. The sound /ž/

is the voiced equivalent of /š/; it is very rarely found in English, and rarely occurs in initial position. The following words can be used in drills.[15]

Initial	Medial		Final	
/š/	/š/	/ž/	/š/	/ž/
shake	asher	azure	ash	garage
sham	Aleutian	allusion	bush	rouge
sharp	dilution	delusion	cash	massage
she	glacier	glazier	dish	mirage
sheep	fission	vision	fish	prestige
shell	mesher	measure	lash	
shin	Confucian	confusion	push	
shoe			wash	
shy			wish	

4.2215 /č/ vs. /ǰ/

English has two affricates, /č/ and /ǰ/, which are not found in Mandarin Chinese. The /č/ begins with the voiceless stop /t/, which is exploded as a voiceless fricative /š/, but the two positions cannot be functionally separated; it is sometimes written /tš/. It is known as the voiceless alveopalatal affricate. Its voiced counterpart /ǰ/ consists of a voiced stop /d/, which is exploded as a voiced fricative /ž/, but they cannot be functionally separated;

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[15] The words with these sounds in medial position should not be used in very early exercises, but they should be introduced fairly early in order to establish /ž/ as a phoneme.

it is sometimes written /dž/. There are not many minimal pairs using these sounds, but the following pairs can be used in drills:

Initial

/č/	/ǰ/
choke	joke
chew	jew
chain	Jane
cheer	jeer
char	jar
cherry	jerry
chaw	jaw

Final

/č/	/ǰ/
etch	edge
h	age
rich	ridge
lunch	lunge
batch	badge

Initial-Final

/č/

chip	teach
chap	catch
chin	such
check	match
chop	watch

Initial-Final

/ǰ/

jail	age
jeep	bridge
joy	judge
jump	edge
June	page

4.2216 /l/ vs. /r/

As indicated earlier English /l/ and /r/ are not the same as Mandarin //l// and //r//; therefore, Chinese students have difficulty in distinguishing /l/ and /r/ in both initial and final positions The English /l/ and /r/ are made in exactly opposite ways: for /l/ the tongue tip touches the alveolar ridge and the air goes out over the sides with voicing and no aspirations; for /r/ the sides of the tongue touch the molar teeth with the tip of the tongue curled back without touching the alveolar ridge while the air goes out over the middle of the tongue with voicing and no aspiration. The following minimal pairs can be used in drills:[16]

Initial		Final		Medial	
/l/	/r/	/l/	/r/	/l/	/r/
lay	ray	dale	dare	alive	arrive
law	raw	deal	dear	believe	bereave
led	red	feel	fear	blight	bright
low	row	fall	four	blush	brush
lie	rye	fail	fair	cloud	crowd
loan	roan	heal	hear	fly	fry
loom	room	hail	hair	glass	grass
line	Rhine	mile	mire	glue	grew
lung	rung	pail	pair	play	pray
lane	rain	rail	rare		
leap	reap	real	rear		
light	right	shale	share		
late	rate				

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[16] Words with these sounds in non-initial and non-final positions are included here because the difficulty of these sounds makes it necessary to have a great amount of practice on them.

4.222 Drills on Clusters[17]

For the sake of brevity this section contains only a few key examples of words using these clusters. Exercises of various types should be prepared for classroom and laboratory drills as described later, in Section 4.55.

4.2221 Most frequent initial clusters

/bl-/	blame, blow, blue, black, blood
/br-/	brain, brow, brew, breath, bread
/dr-/	dray, drain, draw, draw, drip, drew, dream
/fl-/	flame, fleet, float, flown, flood, flute
/fr-/	frame, free, fret, Fred, fruit
/gl-/	glade, glaze, gleam, glide, gloom, glow, glue
/gr-/	grade, graze, groom, ground, groom, grow
/hw-/	whine, whim, wheat, where, which
/kl-/	clap, clack, click, climb, close, clue
/kr-/	cream, creed, crime, crawl, crow
/kw-/	quick, quite, quack, quail, quote
/pl-/	plan, play, plea, plane, plow, ply
/pr-/	press, pray, proud, prune, prow, pry
/sk-/	scan, skin, scare, score, school, scheme
/sp-/	span, spin, spare, spore, spoil, spend
/st-/	stain, stem, stare, store, stone, stand
/tr-/	tray, train, tree, treat, trip, true
/tw-/	twin, twelve, twenty, twist
/str-/	straight, straw, stream, string, strap

4.2222 Less frequent initial clusters

/dw-/	dwell, dwarf
/sf-/	sphere, sphinx
/sl-/	slate, sleep, sly
/sm-/	small, smoke, smack
/sn-/	snap, sneeze, snow
/sw-/	swim, swear, swell
/sr-/	shred, shrink, shrimp
/skr-/	screw, scroll, scratch, script
/skw-/	square, squeal
/spl-/	splash, spleen, split, splice
/spr-/	sprite, spread, spring

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[17] Cf. Fries, pp. 17-18.

4.2223 Initial clusters with glide /y/[18]

/by-/	beauty, bugle, bureau
/dy-/	due, duty, duke
/fy-/	few, fury, fuse, fuel
/hy-/	hue, huge
/ky-/	cue, cube, cure, cute
/ly-/	lieu, lute
/my-/	mule, mute
/ny-/	new
/py-/	pure, puny, pupil
/sy-/	suit, sue
/ty-/	tube, tune
/vy-/	view

4.2224 Final cluster without suffixes[19]

/-dz/	adze
/-ft/	soft, left, tuft

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[18] The pronunciation of this glide after /t/, /d/, /n/, and /s/ is listed here for the sake of completeness; whether or not they would be used as the preferred pronunciation would have to be decided before drills are prepared for specific classes.

[19] Thomas points out in *The Phonetics of American English*, p. 213, that in final clusters /l/ before labial or velar consonants in some dialects becomes the velar allophone [L], a glide [U] or [ə] or allophonic lengthening of the preceding vowel; thus *help* might be pronounced [hɛlp], [hɛLp], [hɛUp], [hɛəp], or [hɛːp]. In planning an instructional program it would be necessary to decide on how much detail of this nature can be used at a particular level, just as it is necessary to decide on which variety of /r/ is to be used and how much detail on dialectal and allophonic variation is to be included. Likewise, a discussion must be made concerning dental consonants with nasals followed by /s/, /z/, and /θ/, because an intrusive [t] or [d] very often occurs in words like *hence* [hɛn^{t}s], *lens* [lɛn^{d}z], and *seventh* [sɛvən^{t}θ]. There are other fine points which would have to be investigated in detail if the goal of instruction is to be the development of pronunciation that is near-native. Many of these distinctions would probably be learned naturally without specific instruction, but the teacher should be aware of them in any case.

/-ks/	box, wax, mix, six
/-kt/	act, sect, fact, tact
/-lb/	bulb
/-ld/	old, cold, child, weld
/-lf/	wolf, golf, gulf, self
/-lk/	silk, milk
/-lm/	film, elm, helm
/-ln/	kiln
/-lp/	help, gulp
/-ls/	false, pulse
/-lt/	belt, bolt, felt
/-lv/	valve, solve, delve
/-lč/	belch, gulch
/-lǰ/	bilge, bulge
/-mf/	nymph, lymph, triumph
/-mp/	limp, pump, thump
/-nd/	and, bend, lend, tend, spend
/-ns/	fence, mince, ounce, tense
/-nt/	ant, hint, hunt, bent, lint, spent, tent
/-nz/	lenz
/-nč/	bench, bunch, lunch, ranch
/-nǰ/	change, hinge, lunge, range
/-ŋk/	junk, monk, rank, sank, sink
/-ps/	copse, lapse
/-pt/	apt, crypt, script
/-rb/	curb, herb, verb
/-rd/	board, card, word
/-rf/	surf, turf, wharf
/-rg/	berg, burg
/-rk/	bark, fork, irk, perk, work
/-rl/	curl, girl, marl, swirl, twirl
/-rm/	harm, warm, worm
/-rn/	barn, warn, turn
/-rp/	carp, chirp, warp
/-rs/	curse, hoarse, parse
/-rt/	cart, court, hurt
/-rv/	curve, nerve
/-rz/	furze, Mars
/-rš/	harsh, marsh
/-sk/	ask, desk, musk, risk, task
/-sp/	asp, lisp, wasp
/-st/	fist, must, rest, roast, wrist
/-kst/	next, text
/-mps/	glimpse
/-mpt/	tempt, prompt
/-ŋks/	jinx, lynx, sphinx
/-rps/	corpse
/-rst/	first, burst
/-rts/	quartz

4.2225 Final clusters with suffixes:

a. /-z/ added after the voiced ending of a syllable (third singular present verbs, plural nouns)

/-bz/	cabs, mobs, sobs, rubs
/-gz/	figs, rugs, bags, sags
/-lz/	balls, calls, falls, rolls
/-mz/	rooms, themes, combs, beams
/-ŋz/	rings, kings, things, hangs
/-vz/	lives, hives, carves
/-ðz/	breathes, wreathes
/-lbz/	bulbs
/-ldz/	colds, holds, builds
/-lnz/	kilns
/-lvz/	shelves, solves, valves
/-rbz/	curbs, verbs, herbs
/-rdz/	cards, words, boards
/-rgz/	bergs
/-rlz/	curls, girls
/-rmz/	worms, warms, harms
/-rnz/	turns, barns, warns
/-rvz/	curves, nerves

b. /-s/ added after the voiceless ending of a syllable (third singular present verbs, plural nouns)

/-fs/	coughs, laughs, muffs
/-ts/	rats, bets, hits
/-θs/	breaths, wreaths
/-dθs/	widths, breadths
/-fts/	tufts, lifts, lofts
/-fθs/	fifths
/-kts/	acts, facts
/-lfs/	gulfs
/-lks/	silks, milks, bulks
/-lps/	helps, gulps
/-lts/	belts, bolts, faults
/-lθs/	healths, wealths
/-mfs/	nymphs, lymphs
/-nθs/	ninths, tenths, thirteenths
/-ŋks/	sinks, ranks, bunks
/-pts/	crypts, scripts
/-rfs/	dwarfs, surfs, turfs
/-rks/	corks, forks, works
/-rps/	chirps, warps
/-sks/	asks, desks, tasks
/-sps/	lisps, wasps

/-sts/	fists, rests, roasts
/-tθs/	eighths
/-ksts/	texts
/-lfθs/	twelfths
/-mpts/	tempts
/-ndθs/	thousandths
/-nkθs/	lengths, strengths
/-rsts/	bursts, thirsts

c. /-d/ added after the voiced ending of a syllable (past tense and past participle)

/-bd/	mobbed, rubbed, sobbed
/-gd/	begged, hugged, tugged
/-md/	climbed, combed, roamed
/-ŋd/	thronged, wronged
/-vd/	craved, lived, moved
/-zd/	praised, raised
/-ǰd/	raged, waged, wedged
/-ðd/	breathed, seethed, wreathed
/-žd/	rouged
/-lmd/	filmed, whelmed
/-lvd/	shelved, solved
/-lǰd/	bulged
/-nǰd/	changed, hinged, ranged
/-rbd/	barbed, curbed
/-rld/	curled, hurled
/-rmd/	stormed, warmed, wormed
/-rnd/	burned, turned, warned
/-rvd/	curved, nerved
/-rǰd/	barged, merged, surged

d. /-t/ added after the voiceless ending of a syllable (past tense and past participle)

/-čt/	touched, matched, patched
/-št/	pushed, rushed, wished
/-lft/	engulfed
/-lkt/	milked
/-lpt/	helped, gulped
/-lčt/	belched, filched
/-lst/	pulsed,
/-lšt/	welched
/-mft/	triumphed
/-nst/	danced, pranced
/-nčt/	lunched, munched
/-ŋkt/	linked, winked
/-pst/	lapsed

/-rkt/	corked, forked, worked
/-rpt/	chirped, warped
/-rčt/	parched, perched
/-skt/	asked, masked, risked
/-spt/	lisped

e. -th added (ordinal numbers and abstract nouns)

/-dθ/	breadth, width
/-fθ/	fifth
/-lθ/	health, stealth, wealth
/-nθ/	tenth, seventh, thirteenth
/-ŋθ/	strength
/-pθ/	depth
/-rθ/	fourth, hearth, worth
/-tθ/	eighth

4.223 Drills on Syllabic Consonants

With appropriate instruction based on the principles discussed in Section 4.214, classroom and laboratory drills can be prepared with the following words:

Syllabic L

article
bottle
fertilize
finally
hospital
idle
little
oriental
penalty
saddle
travel
ventilate

Syllabic N

broaden
certainty
couldn't
curtain
didn't
harden
Latin
monotonous
ordinary
student
wouldn't
bread and butter

4.3 Teaching Stress

4.31 The Importance of Syllabic Stress

From the review of the analysis of the prosodic features of both languages, it is easily learned that stress is one of the distinguishing features of English words in larger phrases. In learning to speak English, if one stresses the wrong syllable, it may sometimes be difficult for the listener to understand what he is trying to say, just as the wrong tone on a given Mandarin syllable very easily causes misunderstanding. Since there seem to be no infallible rules for determining the distribution of stress in polysyllabic English words, it is very difficult for Chinese students to learn not only where to place stress but also how to vary the quality of the syllabic according to the degree of stress.[20] Language teachers should always remember that the location of stress on the syllable must be taught when the students learn to pronounce a new word, new phrase, or new sentence. There are some principles, however, that should be helpful in teaching the syllabic stress.

4.311 "Fore-Stress"

Since English polysyllabic words have a "fore-stress" tendency, unlike the "end-stress" tendency of Mandarin polysyllabic units, the great majority of disyllabic and trisyllabic words in English are strongly stressed on the first syllable. The rest of the syllables of such words are left either less stressed or unstressed.

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[20] In the near future, however, a transformational-generative set of rules will appear in Noam Chomsky, The Sound Patterns of English. It promises to be a rather complete treatment of the principles which explain both of the problem areas mentioned here.

4.312 Noun vs. Verb

A large group of disyllabic words, which may function either as nouns or verbs, often have a difference in their stress pattern to indicate their different functions. In all such cases, the noun is strongly stressed on the first syllable, the verb on the second. The following list contains common examples of these stress patterns:[21]

Noun	Verb
accent /ǽksɛnt/	*accent /əksɛ́nt/
augment /ɔ́gmɛnt/	*augment /ɔgmɛ́nt/
concert /kánsərt/	concert /kɔnsə́rt/
conduct /kándəkt/	conduct /kəndə́kt/
conflict /kánflIkt/	conflict /kənflÍkt/
content /kántɛnt/	content /kəntɛ́nt/
contest /kántɛst/	contest /kəntɛ́st/
contract /kántrækt/	contract /kəntrǽkt/
contrast /kantræst/	contrast /kəntræst/
desert /dɛ́zərt/	desert /dIzə́rt/
digest /dáIjɛst/	*digest /dIjɛ́st/
discard /dÍskard/	*discard /dIskárd/
exploit /ɛ́ksplɔIt/	exploit /Iksplɔ́It/
extract /ɛ́kstrækt/	extract /Ikstrǽkt/

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[21] There are dialectal variations regarding these rules. The words with asterisks often do not follow the rule. This fact should be pointed out to the students probably when they are at the intermediate level.

forecast	/fɔ́rkæst/	*forecast	/fɔrkǽst/
impact	/Ímpækt/	impact	/Impǽkt/
import	/Ímpɔrt/	import	/Impɔ́rt/
incline	/ÍnklaIn/	incline	/InklaÍn/
increase	/Ínkris/	increase	/Inkrís/
insert	/Ínsərt/	insert	/Insə́rt/
insult	/Ínsəlt/	insult	/Insə́lt/
object	/ábjIkt/	object	/əbjɛ́kt/
permit	/pərmIt/	permit	/pərmÍt/
present	/prɛ́zənt/	present	/prIzɛ́nt/
produce	/prádjus/	produce	/prədjús/
progress	/prágrIs/	progress	/prəgrɛ́s/
project	/prájIkt/	project	/prəjɛ́kt/
protest	/prótɛst/	protest	/prətɛ́st/
rebel	/rɛ́bəl/	rebel	/rIbɛ́l/
record	/rɛ́kərd/	record	/rIkɔ́rd/
survey	/sə́rve/	survey	/sərvé/
suspect	/sə́spɛkt/	suspect	/səspɛ́kt/
transfer	/trǽnsfər/	*transfer	/trænsfə́r/
transport	/trǽnspɔrt/	*transport	/trænspɔ́rt/

4.313 The Addition of Prefixes and Suffixes

The complex polysyllabic words which are composed of base morpheme plus either a prefix or a suffix or both are trongly stressed on the root syllable; mid and weak stress fall on affix-syllables as in *háppy*, *háppiness*; *réason*, *réasonable*. However, a few words formed by adding a productive prefix usually receive so-called "double-stress," e.g., *nónstóp*, *únknówn*. Polysyllabic words ending with suffixes -*tion*, -*ic*, -*ical* and -*ity*, almost always have primary stress on the syllable preceding the ending. The addition of one of these suffixes usually results in a shift of stress. Example of such words are *contríbute*, *contribútion*; *biólogy*, *biológical*; *públic*, *publícity*. Another typical example is the polysyllabic word like *photograph* borrowed from the Greco-Latin tradition.[22]

4.314 Compound Words

The English compound word presents a quite complex picture. Compound nouns ordinarily receive a primary stress on the first component syllable, and a mid stress on the second, as in *aírshìp*, *éyeglàss*, *drúgstòre*, *díning ròom*. In addition, the compound words which are composed of noun plus adjective (*séasìck*) and compound adverbs (*hómewàrd*) also tend to have the same stress pattern as compound nouns. However, on the contrary, the compound verbs, compound adjectives and the compound words composed of adjective plus noun, often tend to have a mid stress on the first component syllable and a primary stress on the second, e.g., *òverloók*, *òutrún*, *ìce-cóld*, *skỳ blúe*, *màin stréet*, *bàck dóor*.

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[22] Cf. Chapter III above, Section 3.1126.

4.32 Strong Stress vs. Weak Stress

In addition to the importance of syllabic stress, the contrast between the strong stress and the weak stress is also one of the distinguishing features of the English language. In the flow of English speech, the important syllables are more prominent, and longer; the unimportant syllables are less prominent, a little shorter than those in Mandarin Chinese. Thus, in speaking English polysyllabic words or sentences which contain a group of unstressed syllables, Chinese speakers often find it very difficult to pronounce them with a proper degree of stress and speed and consequently leave out several unstressed syllables.

As mentioned earlier, most grammarians, including some Chinese grammarians, divide all words into two classes: content words and function words. The former have meaning in themselves, like brother, study, believe, time and teacher; the latter have little or no meaning in themselves but merely help to show the grammatical relation between other words, like the, but, of, and in. In general, the content words in English tend to be important and strongly stressed and the function words seem to be unimportant, left unstressed, unless the latter are stressed for special emphasis, as in "He's IN the room, not OUTSIDE the room." In order to make Chinese speakers pronounce the strongly stressed and the weakly stressed syllables properly, and to say the group of unstressed syllables in the polysyllabic words or in the sentences as quickly as they should without leaving out a single syllable, language teachers must train the students to know first where the contrast (strong stress vs. weak stress) is located, and then give more practice. Students will automatically learn the natural stress patterns from the sentences used in oral drills that are written for other purposes, but periodically either through exercises or explanation the teacher should point out the difference in stress on function words and content words.

Drills on such contrasts either in polysyllabic words or in sentences need to be well developed and a considerable amount of practice is absolutely necessary. The following are examples of words and sentences that can be used in classroom and laboratory exercises:

a. Polysyllabic words:

(1) 4 syllables

$/\overset{\smile}{-}\overset{\prime}{-}\overset{\smile}{-}\overset{\smile}{-}/$	$/\overset{\backprime}{-}\overset{\smile}{-}\overset{\prime}{-}\overset{\smile}{-}/$
ability	admiration
agreeable	application
authority	entertainment
comparison	insufficient
accompany	locomotive
impossible	correspondence
affirmative	politician
photography	manufacture

(2) 5 syllables

$/\overset{\backprime}{-}\overset{\smile}{-}\overset{\prime}{-}\overset{\smile}{-}\overset{-}{-}/$	$/\overset{\backprime}{-}\overset{-}{-}\overset{\smile}{-}\overset{\prime}{-}\overset{\smile}{-}/$
anthropology	antimacassar
anniversary	centralization
auditorium	characteristic
contradictory	circumlocution

productivity
satisfactory
indeterminate
zoological

interdependence
mathematician
nationalistic
transcontinental

(3) 6 syllables

$/\underline{\breve{}\,\grave{}\,\breve{}\,\acute{}\,\breve{}\,\breve{}}/$

adaptability
convertibility
encyclopedia
humanitarian
impossibility
incomprehensible
inferiority
familiarity

$/\underline{\grave{}\,\breve{}\,\acute{}\,\breve{}\,\breve{}\,\breve{}}/$

automatically
ceremoniously
editorially
indistinguishable
economically
intellectually
indefatigable
uncooperative

b. Sentences:[23]

(1) She decláres that she líkes ráts, dóesn't she?

(2) I don't imágine you can succéed in a búsiness venture.

(3) This réd róse is to be plánted hére.

(4) He éats thrée fúll méals éach dáy.

(5) I shall delíver it to you.

4.33 The Reduction of Syllabic Value in Unstresses Syllables

As indicated in Chapter III, the English syllabic value of function words may be reduced when they receive weak stress; this phenomenon also occurs in the content words. It is usually called "reduction" and is one of the most important features of English pronunciation. In simple terms, it is a change of the syllabic in unstressed syllables to either /ə/ or /I/. This is another great difficulty for Mandarin speakers learning English as a foreign language since they often see the way the word is spelled and wish to give each syllable its full value. Besides, to date there has been very little systematic pedagogical work on this matter. Even native speakers of English often must consult a dictionary to find out the correct stress pattern and pronunciation for new or unfamiliar words. Chinese students are forced to do the same, but more often.

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[23] These sentences are taken from Prator's Manual, p. 26.

There is a group of common monosyllabic words which are frequently reduced and consequently obscured, namely, the, of, and, to, a, in, that, it, is and I. These ten make up twenty-five percent of all that is spoken and written in English; or one out of every four words people use will be the, or of, or and, etc. In order to avoid a foreign accent, one must learn to lower the stress and produce the reduction vowel when pronouncing these words. The following table is the reduced value of these words. Special drills should be prepared to call the student's attention to these reductions, but they will be most effectively learned as the student develops the natural rhythm of the sentences and phrases used in all classroom and laboratory drills.

TABLE XLII

WORDS MOST FREQUENTLY OBSCURED[24]

Word	Full Value	Reduced Value	Example	Remark
a	/e/	/ə/	in a minute /In ə mInIt/	These words are almost always reduced.
an	/æn/	/ən/	get an egg /gɛt ən ɛg/	
and	/ænd/	/ən/	high and low /haI ən lo/	
of	/av/	/əv/	two of you /tu əv jU/	
or	/ɔr/	/ər/	one or two /wən ər tu/	
the	/ði/	/ðə/	on the right /ɔn ðə raIt/	
to	/tu/	/tə/	five to three /faIv tə θri/	
are	/ar/	/ər/	they are ready /ðe ər rɛdI/	These words are usually reduced except when they receive sentence-stress.
can	/kæn/	/kən/	we can go /wi kən go/	
had	/hæd/	/həd/	I had been /aI həd bIn/	
has	/hæz/	/əz/	It has gone /It həz gɔn/	
have	/hæv/	/həv/	we have seen /wi həv sin/	
was	/waz/	/wəz/	It was late /It wəz let/	
that	/ðæt/	/ðət/	those that went /ðoz ðət wɛnt/	It is reduced when used as a relative pronoun or conjunction; it is stressed as a demonstrative.

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[24] This table is based on the analysis of Prator, p. 28.

4.34 The Stress-timed Rhythm

As indicated in the very beginning of this study, English is a stress-timed language whereas Mandarin tends to have a syllable-timed rhythm. This difference may be demonstrated by the following two popular poems:

English poem: "A Vagabond Song" by Bliss Carman

There is sómething in the aútumn that is nátive to
my blóod--
Tóuch of mánner, hínt of móod;
Ànd my héart is líke a rhýme,
With the yéllòw and the púrple and the crímson
kéeping tíme.

Chinese poem: "In the Quiet Night" by Lee Bai

chuángqìan míngiùə guáng,
í shì díshàng shuáng.
jǘ tə̀u uáng mìngiuə́,
dí tə̀u sí gùxíang.

Translation: by Y. P. Tau

"So bríght a gléam on the fóot of my béd--
Còuld thére have béen a fróst àlréady?
Lífting mysélf to lóok, Ì fóund that it was móonlìght.
Sínking báck agáin, I thóught súddenlỳ of hóme."

In keeping the natural rhythm of English one must make the stressed syllables of each utterance recur regularly and thus obscure the unstressed syllables, pronouncing them fast enough to have approximately the same time lapse between each two heavy stresses whereas in Mandarin the time intervals tend to be the same between each successive syllable since each utterance (line) has the same number of syllables and only two levels of stress, as indicated by the stress marks above. This difference in rhythm is also a problem in teaching English to Chinese speakers. Prator suggests five steps for acquiring good English speech rhythm. It is a quite useful approach. Many exercises should be developed on these principles. The five steps are:[25]

a. Giving proper emphasis to stressed syllables, and making them recur rather regularly within a thought group.

b. Weakening unstressed words and syllables and obscuring the vowels in most of them.

c. Organizing words into thought groups properly by means of pauses.

d. Blending the final sound of each word and syllable with the initial sound of the one following within the same thought group.

e. Fitting the entire sentence into a normal intonation pattern.

Following the steps above, one can develop exercises using utterances such as the following in which all have three stressed syllables:[26]

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[25] Cf. Prator, p. 25.

[26] This exercise is taken from Prator, pp. 32-33. The purpose of Prator's exercise is very good, but the

(1) a. Dógs éat bónes.
b. The dógs éat bónes.
c. The dógs will éat bónes.
d. The dógs will éat the bónes.
e. The dógs will have éaten the bónes.

(2) a. The cár is hére nów.
b. The cár is out frónt nów.
c. The cár will be out frónt sóon.
d. The cár will be out frónt in a móment.

(3) a. Bóys néed móney.
b. The bóys will néed móney.
c. The bóys will néed some móney.
d. The bóys will be néeding some of their móney.

(4) a. A drúgstore's the pláce to have lúnch.
b. We shall sóon finish úp for the semést er.
c. Júne is a níce mónth.
d. We were enchánted by her intélligent conversátion.
e. Gréat dáy in the mórning.

4.4 Teaching Intonation

Since there are so many similarities between the features of juncture and prosodic pitch in both languages, and since these two features are very closely associated with the intonation contour, it does not seem necessary to discuss these features at length in this study. However, since the intonation contours are very complex in both English and Chinese, a deeper comparative study of the intonation in both languages might show that a more elaborate treatment would be desirable. The best way to teach English intonation to

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teacher must be careful to forewarn the students about secondary and tertiary stresses such as those in (2), (3) and (4); the principle remains the same, but the secondary stresses considerably lengthen the time intervals in which they occur.

Chinese speakers is to have them imitate models and to give them plenty of practice. There are several important points which language teachers must keep in mind when preparing drills, whether the drills are just for teaching intonation or for other purposes.

4.41 The Importance of Juncture

It is obviously impossible to speak any language without making pauses. In order to make the meaning clear or for special emphasis, or to catch one's breath, a pause or pauses must occur between sequences of syllables. Since the languages have different stress systems, Mandarin speakers often speak English sentences with nearly regular recurrence of word-stresses so that they fail to make natural pauses in the sentence, thus making the utterances jerky. Very often the sentences become intolerably monotonous and may even be unintelligible. Generally speaking, in the English sentence, no pause is made within a closely related structure or group of words. Language teachers should always caution their students not to make any pause between the following structures:

(1) Adjectives or articles and the nouns they modify:
    a. wonderful person
    b. a beautiful picture

(2) Auxiliary verbs and the accompanying main verbs:
    a. are broken
    b. has brought

(3) Prepositions and the nouns dependent on them:
    a. of the war
    b. for the performance

(4) Adverbs modifying adjectives:
    a. the most beautiful
    b. the very best

(5) Pronoun subjects and verbs unless the subject receives unusual stress:
    a. I am
    b. he is

4.42 A Problem Concerning Terminal Junctures and Questions

It has been said that in English the rising contour is normally used at the end of a question which does not begin with an interrogative word: why, who, where, etc.; that is, it goes with a yes-or-no question whose wording is in a question form or a statement form. However, this is not true for Mandarin Chinese: both types of questions have a rising contour. Therefore, language teachers must be sure to direct Chinese speakers to say:

2 3 1 — 2 33 — 2 3 3
Who is it ↓ not Who is it ↑ (like: Is he coming ↑)

2 3 1 — 2 3 3 — 2 33
What do you want ↓ not What do you want ↑ (like: You want tea ↑)

These three intonations may be given in examples like the following sentences:

a. /2 3 1 ↓/

The car is ready.

He came to see me.

I said I couldn't hear you.

Jane has a new piano teacher.

Bill doesn't enjoy intellectual games.

What did you bring?

What did you tell her?

How are you feeling?

What is he studying for?

Whom did you want to speak with?

b. /2 3 3 ↑/

Is he there?

Are you ready?

Are you leaving?

Can you get it for me?

Do you want tea?

Is your name Tom?

Will you drive to the office tomorrow?

Does he expect to take a blanket with him?

Is she walking to the party this evening?

It's time for the class to end?

c. /2 3 2 → 2 3 1 ↓/

I called him, but he didn't answer.

Since we didn't have money, we had to walk.

I'd like to see that movie, but I don't think I can.

Are you going to work tonight, or go to the movies?

In addition, there is another contour which is also eeded to practice as follows:

/2 3 2 → 2 3 3 ↑/

If I see him, should I give this to him?

When you are at home, do you speek English?

If I find the answer, do you want me to call you?

4.5 Methodology

Effective teaching entails not only knowing "subject-matter" well enough, but also being skilled in the use of teaching techniques. Both "What to teach?" and "How to teach?" are equally important in the learning process. In the past thirty years many new developments of language teaching both in theory and in techniques have appeared in the teaching of foreign languages. The major principles underlying these developments are discussed very briefly below. In a strictly pedagogical study much more attention would have to be given to them, but since the primary purpose of the present study is a contrastive analysis of the syllable patterns with their prosodic features in the two languages, the following comments must be brief.

4.51 Primacy of the Spoken Language

Since the spoken language is primary, the sounds of a language, that is, the features of the phonemes, syllables, and intonational patterns of the English language should take precedence, instead of "grammar-translation methods." The so-called audio-lingual approach based on the principle of listening and speaking first, and reading and writing next must be adopted.[27]

4.52 Transfer and Interference

Since the learning process involves both transfer and interference in regard to both target language and native language, the knowledge and the presentation of the contrast analysis of certain features of both languages to the students before learning the speech sounds of any language are necessary.

4.53 The Importance of Intonation

As indicated above, the speech is the most complete form of language; thus, the first formal exercise in learning the speech sounds of the target language should give some attention to intonation and rhythm. The imitation and memorization of basic conversational sentences with their prosodic features must be required as early as possible and learning accuracy must be stressed from the very beginning. It is often more effective to teach syllabic patterns (including consonants and vowels) with appropriate intonation and in appropriate rhythm units than to teach them in detail by themselves, later attempting to fit them into authentic intonation and rhythm.

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[27] Another term for the audio-lingual approach is "oral-aural method." This method is especially designed to capitalize on the primacy of speaking and listening in the learning of a language.

4.54 The Importance of Good Models

Speech can not be invented by the students; it has to be imitated. Good models do not guarantee good imitation, but they are necessary to permit good responses. Therefore, teachers who are native speakers having a standard dialect are more desirable as models than tapes or disc recordings, though these also provide good models. In addition, since observation shows that merely imitating good models does not always produce good pronunciation after childhood, it is often necessary to improve teaching techniques by several means: using facial diagrams, articulatory descriptions, a mirror; splitting an utterance into smaller parts or rendering it more slowly so that the student may focus his attention on the parts separately; and employing minimal contrast to focus sharply on the phonemic differences. If used well these can increase the facility and fluency of speech.

4.55 Different Kinds of Drills

Establishing the speech patterns as habits through pattern practice is the basic step in developing the student's oral ability with appropriate vocabulary at normal speed for communication. The following are some of the most effective and common pattern drills. In doing any kind of drills, teachers should give the model sentence two or three times to show the students exactly what the intonation is and what the features of sound are; only after such preparations can practice be fruitful.

a. Substitution: In this drill, students use another word of the same class in the place of a word in the sentence:

(1) I have a *pencil*

Book: I have a *book*. *Ruler*: I have a *ruler*.

(2) John saw *the man*.

Him: John saw *him*. *His father*: John saw *his father*.

b. Transformation (or conversion): The student is given practice in changing from affirmative sentene to negative or to interrogative sentence, or from present to past or to future, etc.:

He has a book.

He doesn't have a book. or Does he have a book?

or He had a book.

c. Paired Sentences: In this pattern, the teacher will give a sentence and then ask a question:

John likes to study. What about you?

I like to study too.

d. Expansion: The students will be given a word or expression to be added to a sentence which the teacher gives them:

I have a book.

Always: I always have a book.

Always, *blue*: I always have a blue book.

e. Integration: Students are asked to put two short sentences together to make one sentence:

I have a book. It's blue.

I have a blue book.

4.56 Vocabulary Study

It is inadvisable to force the students to memorize a great amount of vocabulary in the beginning stages of instruction. Words alone, no matter how many there are, do not constitute speech. In order to have students master the sound system and grammatical patterns, proper control of the vocabulary load at the beginning is necessary. However, expanding the vocabulary to an adequate level is a prerequisite for the development of listening and reading skills. In speaking and writing, one can choose his words and use a paraphrase where a specific word is not known. But in listening or reading, one cannot choose the words. Therefore, a minimum vocabulary for listening and reading is larger than one for speaking and writing.[28] Language teachers can help students enrich their vocabularies by classifying the syllable structures based on sound patterns. These patterns then can be used as mnemonic devices in recalling vocabulary items.

a. /-en/

fain, gain, pain, rain, vain, brain, chain, grain, plain, drain, stain, strain, Spain, sprain, slain.

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[28] Cf. Lado, Language, p. 116.

b. /-Ip/

dip, hip, jip, lip, pip, rip, tip, zip, chip, clip, flip, grip, skip, ship, slip, snip, whip.

c. /-æk/

back, hack, Jack, lack, rack, sack, tack, black, clack, crack, quack, stack, shack, slack, smack, whack, knack, track.

Later prefixes and suffixes can be used in building vocabulary:

a. Prefixes

re-	react, recall, rejoin, remove, retell.
un-	unable, unhappy, unkind, unfashionable.

b. Suffixes

-ance	attendance, acceptance, acquaintance, appearance, insurance
-ence	experience, audience, confidence, prudence, hence.
-sion	pension, tension, version, collision, mansion, impression.

Recognition of patterns in compound structures also is useful, as the use of bed in bedspread, bedroom, bedclothes. Likewise, derivational processes can be used effectively as in poem, poet, poetry, poetic.

4.57 Technology

There are many technological aids which are commonly used in language teaching. Among such aids are tape recorders, filmstrips, films, radios, television, teaching machines, programmed learning. The language laboratory, however, occupies the most prominent place among all recent technological advances in language teaching. The language laboratory is a separate room where students may practice speaking and listening with the aid of tape recorders, earphones, microphones, and other sound equipment, chiefly as an audio-lingual supplement to class work. Such a laboratory supplements the work of the teacher, and provides the most useful method of providing the student with such important advantages as authentic prosodic features so that the student may hear the model repeated as many times as he needs. It is highly recommended by most educators and linguists. Language teachers should make every attempt to use it extensively.

4.58 Testing

The testing and evaluation of the student's progress in language learning should be an integral part of the curriculum. Linguistic research shows that the use of translation, grammatical analysis, and production of words in isolation do not test how well the student has developed the four skills. The tendency of new testing programs is to measure the mastery of the units and patterns that are different from those of the native language and constitute the overcoming of interference from the native language, that is, problems arising from differences in the sound systems, grammatical structure, word formations, and special cultural meanings related to linguistic items. The techniques vary greatly in testing of such problems. The following are some examples which can be used to test the student on the sound system of the target language.[29]

a. Auditory Perception: the examiner reads aloud a minimal pair or a pair of utterances and asks the students to

(1) Distinguish the difference between the sounds; e.g.,

sheep, ship
thin, din
He is watching the dog.
He is washing the dog.

(2) Indicate which words rhyme; e.g.,

send, lend
friend, fiend
enough, through

(3) Mark the syllable having the primary stress; e.g.,

insult (noun), insult (verb)
absent (verb), absent (adjective)
uniform, black bird

(4) Indicate the falling or rising intonation, e.g.

You're hungry, aren't you?
What are you looking for?
I think that is a good idea.

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[29] Cf. Robert Lado, Language Testing (London, 1961), pp. 48-56. Also Nelson Brooks, Language and Language Learning (New York, 1964), pp. 214-224.

(5) Indicate stress and juncture; e.g.,[30]

false tile, fall style

platerail, play trail

a grade A paper, a gray day paper

b. Production Technique: The testing of speaking ability is more difficult than the testing of auditory perception. There are several techniques commonly used for this purpose:

(1) Repetition: imitate a model utterance.

(2) Reading aloud: read a passage aloud.

(3) Response or rejoinder: respond to questions or make a statement or rejoinder in response to a spoken utterance.

The first two would be appropriate for finding out how well the student has mastered such phonological patterns as terminal junctures, stress placement, timing, vowel reduction, assimilation in nonsyllabic clusters, and the production of specific segmental phonemes. But if the teacher wants to test the student's mastery of the language, he must use the third technique.

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[30] Cf. Harold B Allen, Verna L Newsome, Thomas H. Wetmore, Helen J. Throckmorton, Enola Bargh, New Dimensions in English (Wichita, Kansas, 1966), p. 26.

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